# Model 590 Control Valve

## Operation, Parts, and Instruction Manual

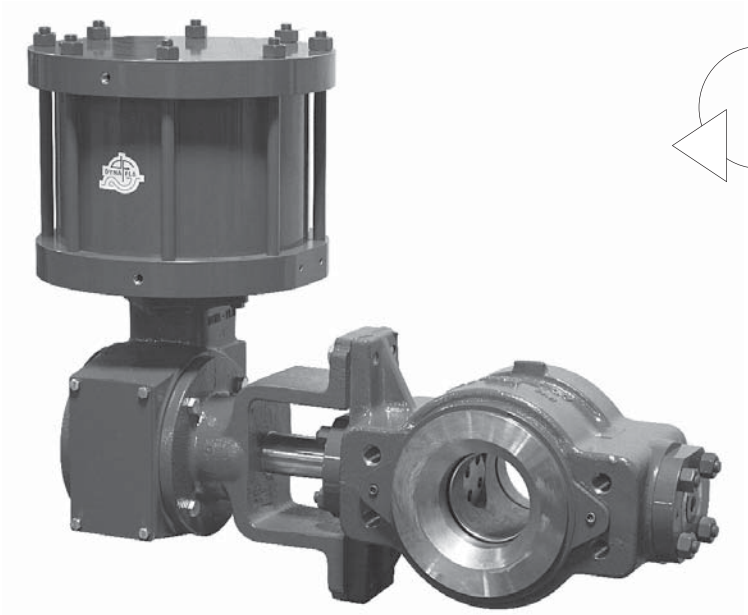

**Figure 1**
*6 Inch 590 with DFRP-112*

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Phone: 780 • 469 • 4000 Toll Free: 1 • 866 • 396 • 2356 Fax: 780 • 469 • 4035 Website: www.dynaflo.com

**NOTICE**

These instructions are meant to be used with the Dyna-Flo 590 Technical Bulletin as they refer to Figures and Tables therein. If you do not have the Technical Bulletin, contact Dyna-Flo immediately, or visit **www.dynaflo.com**

Each control valve is factory checked. Check the calibration for the specific application, before a valve is put into service.

It is the intention of this document to provide users with an accurate guide for safe installation and maintenance of the 590 Control Valve. Revisions and updates are available at above mentioned website.

## GENERAL

**The following instructions are to be thoroughly reviewed and understood prior to installing, operating or performing maintenance on this equipment. Work on this equipment should be performed by experienced personnel. Throughout the manual, safety and caution notes appear and must be strictly followed, to prevent serious injury or equipment malfunction.**

## SCOPE

The control valve configuration and construction materials were selected to meet particular pressure, temperature, and process conditions. Some material combinations are limited in their pressure and temperature ranges. Do not apply any other conditions to the valve without first contacting your Dyna-Flo sales office.

This manual is written to be a practical and useful guide maintaining the Dyna-Flo 590 Control Valve.

### SAFETY CAUTION

**Only well trained experienced technicians should perform these procedures. Use safe work practices and lock out procedures when isolating valves and actuators. It is also important to wear the proper protective equipment when performing any installation or maintenance activity. Use only parts and materials rated for the process being used, operating conditions, and environmental conditions products will be used in.**

**To avoid personal injury or installation damage as a result of the sudden release of process pressure or damage to equipment, do not install the valve assembly where service conditions could exceed the limits stated in this manual, sales bulletin or on the equipment nameplates. Use government codes, accepted industry standards and good piping practices, and select proper pressure-relieving equipment for protection of your installation. Always be aware of flammable process and instrument gas.**

**Always be aware of the hazards of actuators, especially spring-loaded actuators. Be sure that the actuator is de-energized or in the failed position before performing any maintenance procedure.**

**These valves have dangerous pinch points. Never put your hands inside the valve unless you are certain that the ball cannot rotate.**


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## SPECIFICATIONS

**Available Valve Configurations**

The 4", 6", 8", 10", 12", and 16" flangeless valves will mate ASME Class 600 and 900. See Table 1 of Sales Bulletin.

Rotary ball valve assembly available with:

- Single Ball Seal
- Dual Ball Seal
- Flow Ring

**Maximum Inlet Pressure**

4 through 12 inch valve body consistent with Class 600 and 900 ASME B16.34.

16 inch valve body consistent with Class 600 ASME B16.34.

**Maximum Allowable Shutoff Pressure Drop**

**Single Seal and Dual Seal:** See Figure 10 of Sales Bulletin.

**Flow Ring:** Limited by the pressure/temperature rating of the valve body.

**Material Temperature Capabilities**

**Single Seal and Dual Seal:**

-50ºF to 180ºF (-46ºC to 82ºC) LCC Body.
-20ºF to 180ºF (-29ºC to 82ºC) WCC* Body.
-20ºF to 180ºF (-29ºC to 82ºC) CF8M Body.

**Flow Ring with Fluorocarbon O-Rings:**

-50ºF to 400ºF (-46ºC to 204ºC) LCC Body.
-20ºF to 400ºF (-29ºC to 204ºC) WCC* Body.
-20ºF to 400ºF (-29ºC to 204ºC) CF8M Body.

***Note:** WCC body material is special order.

**Construction Materials**

See Parts section of manual for material listings. Contact your Dyna-Flo sales office for more information and other options.

**Flow Direction (See Figures 37 & 38)**

**Single Seal Configuration:** Forward flow only.

**Dual Seal Configuration:** Required for bidirectional flow shutoff.

**Flow Ring Configuration:** Forward or reverse flow.

**Actuator Mounting**

Right-hand, or Left-hand (as viewed from seal end of valve). In one of 4 positions (12 (Std.), 3, 6, and 9 o'clock) with respect to the valve body in a horizontal pipe.

**Maximum Ball Rotation**

90 degrees.

**Shutoff Classification**

**Single Seal and Dual Seal:** 0.0001% of maximum valve capacity (less than 1% of Class IV, ANSI/FCI 70-2 and IEC 60534-4).

**Flow Ring:** 1% of maximum valve capacity

**Flow Characteristic**

Modified Equal Percentage

**Valve Dimensions**

See Figure 4 for valve diagram.

See Tables 5 & 6 for valve dimensions.

**Approximate Valve Weight**

See Table 2.

**Valve Sizing Coefficients**

See Table 9 of Sales Bulletin.

For more information and other options contact your Dyna-Flo sales office.

**Table 1**

**Model 590 Available Valve Size and ASME Rating**

| Valve Size Inch | ASME Rating | |
|---|---|---|
| 4 | 600 | 900 |
| 6 | 600 | 900 |
| 8 | 600 | 900 |
| 10 | 600 | 900 |
| 12 | 600 | 900 |
| 16 | 600 | |

## UNPACKING VALVE FROM SHIPPING CONTAINER

**Special Tools Required:**

- Properly Rated Lifting Straps (2 – 4 Straps) See Table 2 for valve weights.
- Lifting Device (Example: Crane)

Check the packing list, verify that the list includes all the materials in the shipping container before unpacking.

Place the lifting straps around the neck of the actuator and valve body (See Figure 2). Straps should be placed to avoid damage to tubing and other mounted accessories.

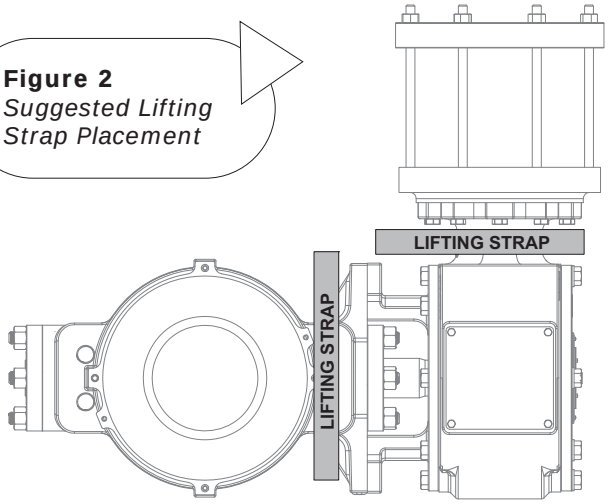



**Figure 2**
*Suggested Lifting Strap Placement*

## INSTALLATION

**Before You Begin:**

- Read the General and Scope section of this manual (Page 2).
- Read Safety Caution (Page 2).
- Place the valve into the OPEN position, this helps to prevent damage to the valve ball (Key 2) during installation.
- Sudden movement of actuator can cause damage or injury. It helps to have the actuator de-energized as long as the valve remains in the OPEN position.
- Use safe work practices and lock out procedures before placing valve in-line.

**Parts Required:**

- Flange Studs (Key 51) **Note:** Flange Studs will need to span the distance from one line flange, across the valve body, and though the other line flange. (See Table 3 & 4 for stud lengths & Figure 3 for stud placement)
- Long Cap Screws (Key 53) **Note:** Long Cap Screws pass through the line flanges and thread directly into the valve body. Long Cap Screws will be required for the outlet side of the valve for single seal valve configurations. (See Table 3 & 4 for cap screw length and Figure 3 for cap screw placement)
- Short Cap Screws (Key 52) **Note:** Short Cap Screws pass through the line flanges and thread directly into the valve body. (See Table 3 & 4 for cap screw length and Figure 3 for cap screw placement)
- Appropriate Line Flange Gaskets.

**Installation Steps:**

**1** Clean dirt, welding chips, scale, or other foreign material from the line and flange surfaces.

**2** Valve may be installed in any orientation, although to reduce stress and wear on valve assembly it is recommended that valve be installed with the valve shaft (Key 17) horizontal to the ground.

**3** **For Single Seal Construction**
Center the valve in-line as indicated by flow arrow (See Figure 37 & 38), standard flow direction has the seal protector ring (Key 26) facing up stream.

**For Dual Seal Construction**
Center the valve in-line so the flow direction with the highest pressure matches the direction of the flow arrow (see Figure 36, 37, 38).

**4** Install the line flange gaskets.

**5** Apply anti-seize compound (Key A) to the threads of the flange studs (Key 51) and cap screws (Keys 52 & 53).

**6** Tighten the flange studs and cap screws in even increments in a crisscross pattern until the correct line bolt torque specification is reached.

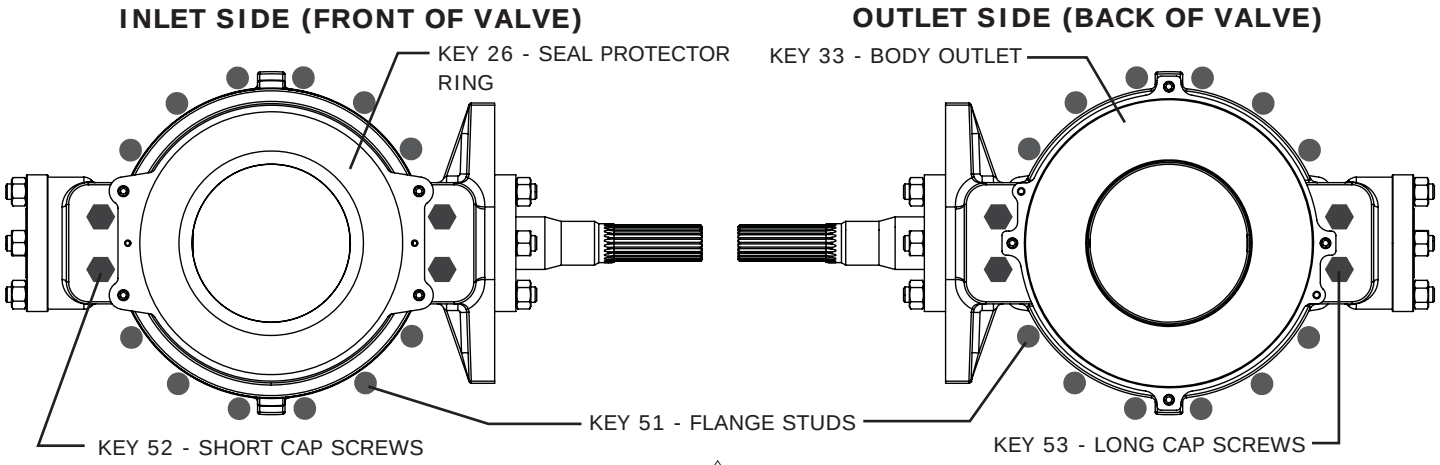

INLET SIDE (FRONT OF VALVE)
OUTLET SIDE (BACK OF VALVE)
KEY 26 - SEAL PROTECTOR RING
KEY 33 - BODY OUTLET
KEY 51 - FLANGE STUDS
KEY 52 - SHORT CAP SCREWS
KEY 53 - LONG CAP SCREWS

**Figure 3** *Line Bolt Placement Example (10 Inch 590 Shown) See Figure 4 for alternative view*

## INSTALLATION (Continued)

### AIR PIPING

**WARNING:**

Property damage, environmental harm, and personal injury can result from the use of supply gas other than clean, non-corrosive, oil and moisture free air. Do not exceed the supply pressure indicated on the serial plate located on the actuator.

**Before You Begin:**

**Note:** Standard actuators accept ¼" (6 mm) NPT connections.

- Refer to the appropriate actuator instruction manual when necessary.

**Piping Installation Steps:**

**1** Use 3/8" (outside diameter) tubing (or equivalent) for air lines.

**2** Install the required line vents, valves, drains, seals, and filters to the actuator.

**Table 2**

**Model 590 Approximate Valve Weight**

| Valve Size Inch | lb (Kg) |
|---|---|
| 4 | 160 (73) |
| 6 | 290 (132) |
| 8 | 490 (222) |
| 10 | 760 (345) |
| 12 | 950 (431) |
| 16 | 1700 (771) |

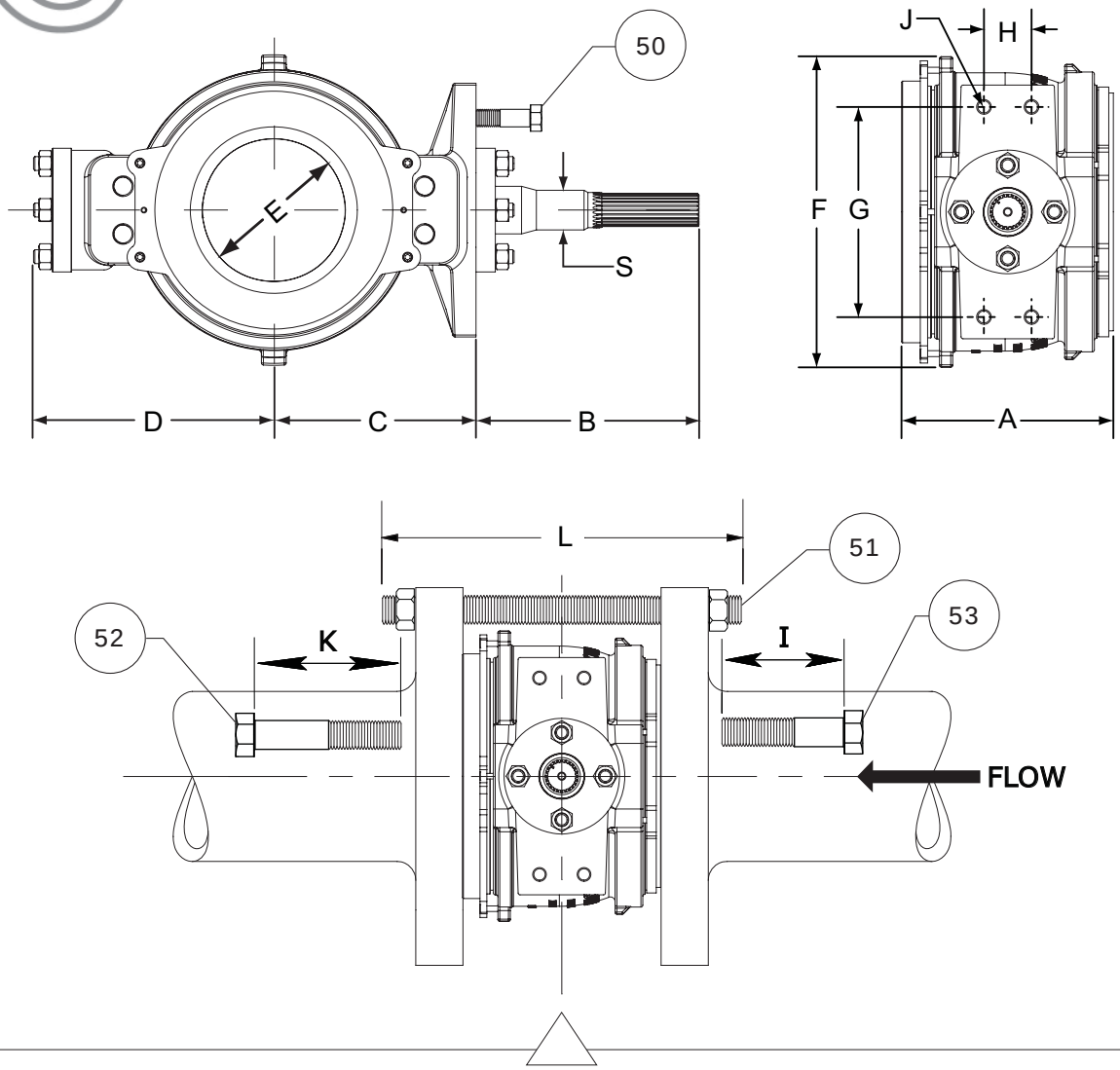



**Figure 4** *Valve Dimensions and Line Bolting*

**Table 3**

**Model 590 Valve Dimensions - Flange Bolting - Class 600** Inch

| Valve Size | Dimensional Reference | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RF | | | | | | RTJ | | | | | | TPI |
| | I | QTY. | K | QTY. | L | QTY. | I | QTY. | K | QTY. | L | QTY. | |
| **4”** | - | - | - | - | 13.50 | 8 | - | - | - | - | 14.50 | 8 | 7/8 - 9 |
| **6”** | 4.63 | 4 | 4.63 | 4 | 16.25 | 8 | 4.88 | 4 | 4.88 | 4 | 16.25 | 8 | 1 - 8 |
| **8”** | 5.50 | 4 | 5.38 | 4 | 17.50 | 8 | 5.63 | 4 | 5.50 | 4 | 17.75 | 8 | 1-1/8 - 8 |
| **10”** | 6.25 | 4 | 6.38 | 4 | 20.75 | 12 | 6.50 | 4 | 6.50 | 4 | 20.75 | 12 | 1-1/4 - 8 |
| **12”** | 7.00 | 4 | 6.00 | 4 | 23.00 | 16 | 7.00 | 4 | 6.50 | 4 | 23.00 | 16 | 1-1/4 - 8 |
| **16”** | 7.75 | 4 | 7.75 | 4 | 26.00 | 16 | 8.00 | 4 | 8.00 | 4 | 26.50 | 16 | 1-1/2 -8 |

**Table 4**

**Model 590 Valve Dimensions - Flange Bolting - Class 900** Inch

| Valve Size | Dimensional Reference | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RF | | | | | | RTJ | | | | | | TPI |
| | I | QTY. | K | QTY. | L | QTY. | I | QTY. | K | QTY. | L | QTY. | |
| 4” | 4.88 | 4 | 4.88 | 4 | 14.75 | 4 | 4.88 | 4 | 5.13 | 4 | 14.75 | 4 | 1-1/8 - 8 |
| 6” | 5.00 | 4 | 5.00 | 4 | 17.50 | 8 | 5.00 | 4 | 5.25 | 4 | 17.50 | 8 | 1-1/8 - 8 |
| 8” | 6.00 | 4 | 5.88 | 4 | 19.00 | 8 | 6.00 | 4 | 6.13 | 4 | 19.00 | 8 | 1-3/8 - 8 |
| 10” | 6.63 | 4 | 6.75 | 4 | 21.50 | 12 | 6.63 | 4 | 6.88 | 4 | 21.50 | 12 | 1-3/8 - 8 |
| 12” | 7.25 | 4 | 6.63 | 4 | 24.00 | 16 | 7.25 | 4 | 7.50 | 4 | 24.00 | 16 | 1-5/8 - 8 |

**Table 5**

**Model 590 Valve Dimensions** Inch (mm)

| Valve Size | Dimensional Reference | | | | | |
|---|---|---|---|---|---|---|
| | B | S | | C | D | E (Bore Diameter) |
| | | Spline Diameter | Shaft Diameter | | | |
| 4” | 8.19 (208) | 1.25 (31.8) | 1.25 (31.8) | 6.38 (162) | 7.75 (197) | 3.00 (76.2) |
| 6” | 14.00 (356) | 2.00 (50.8) | 2.00 (50.8) | 7.62 (194) | 9.38 (238) | 4.00 (101.6) |
| 8” | 14.00 (356) | 2.50 (63.5) | 2.50 (63.5) | 10.62 (270) | 12.88 (327) | 6.00 (152.4) |
| 10” | 14.00 (356) | 2.75 (69.9) | 2.50 (63.5) | 11.31 (287) | 13.50 (343) | 7.38 (187.5) |
| 12” | 14.00 (356) | 3.00 (76.2) | 2.50 (63.5) | 12.75 (324) | 15.00 (381) | 9.00 (228.6) |
| 16” | 18.50 (470) | 2.50 (63.5) | 4.00 (101.6) | 15.44 (392) | 18.12 (460) | 11.50 (292.1) |
| | 20.00 (508) | 3.50 (88.9) | | | | |

ASME Class: 600 and 900
- Envelope Dimensions are + / - 0.25 in. (6.4 mm)
- Face to Face Tolerance Per ASME

**Table 6**

**Model 590 Valve Dimensions Continued** Inch (mm)

| Valve Size | Dimensional Reference | | | | |
|---|---|---|---|---|---|
| | A | F | G | H | J |
| 4” | 7.62 (194) | 11.00 (279) | 9.25 (235) | 1.81 (46) | 5/8 - UNC |
| 6” | 9.00 (229) | 12.88 (327) | 10.75 (273) | 2.00 (51) | 3/4 - UNC |
| 8” | 9.56 (243) | 16.25 (413) | 13.25 (337) | 3.00 (76) | 7/8 - UNC |
| 10” | 11.69 (297) | 17.50 (445) | 13.25 (337) | 3.00 (76) | 7/8 - UNC |
| 12” | 13.31 (338) | 19.00 (483) | 13.25 (337) | 3.00 (76) | 7/8 - UNC |
| 16” | 15.75 (400) | 24.12 (613) | 21.00 (533) | 5.00 (127) | 1-1/4—8UN |

ASME Class: 600 and 900
- Envelope Dimensions are + / - 0.25 in. (6.4 mm)
- Face to Face Tolerance Per ASME

## PERIODIC INSPECTION

**Special Equipment Required:**

- Bypass or block valves.

**Before You Begin:**

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Disconnect supply lines (air or gas), electric power, or control signal to the actuator. Sudden movement of actuator can cause damage or injury, make sure actuator will not operate.
- Vent any pneumatic actuator loading pressure and relieve any actuator spring preload if present.
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve. Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. For dual seal valves, relieve internal pressure by removing the pipe plug (Key 37). See Figure 38 on Page 32.

**Inspection Steps:**

**1** Check for visible signs of leakage around all seal and gasket areas.

**2** Check the valve for damage, especially damage caused by corrosive fumes or process drippings.

**3** Clean and repaint the areas as required.

**4** Ensure all accessories, mounting brackets, and fasteners are secure.

**5** Clean any dirt and foreign material from the valve shaft (Key 17).

## MAINTENANCE

**Note:** Shaft seals or live loaded packing and ball seals (Key 30) should all be inspected frequently for leaks, wear and damage. Maintenance to the shaft seals or live loaded packing can be made while the valve is still in-line, the actuator must be removed for drive shaft (Key 17) seal/pacing maintenance (See Page 12 for Actuator Removal instructions).

**Note:** Perform ball seal (Key 30) maintenance when the control valve will not properly shut off. Ball seal maintenance can be performed without removing the actuator from the valve. Ball seal maintenance cannot be performed with the valve in-line. When removing the valve from pipe line be sure it is in the OPEN position, verify the valve is open using the indicator scale (Key 24) before removing from line.

**Note:** When testing the seal integrity of the valve using the pipe plug port (dual seal configuration), it is recommended that the pipe plug (Key 37) be replaced by a hand valve. A hand valve will allow valve pressure to be relieved safely during seat leak rate testing. See Figure 38 for pipe plug location.

**Before You Begin:**

- Read Safety Caution (Page 2).
- Determine if valve has shaft seals or live loaded packing (See Figures 31 & 37).
- Determine if valve is single seal or dual seal (See Figures 37 & 38).
- Follow Steps 2 – 5 of PERIODIC INSPECTION Before you begin.

### SHAFT SEAL MAINTENANCE

**Note:** It is recommended that the follower shaft seal and the drive shaft seal be replaced at the same time. The actuator must be removed for drive shaft seal maintenance. For live loaded packing see Page 25.

**Special Tools Required:**

- Mechanics Pick Set

**Lubricants Required:**

- Anti-Seize Compound (Key A)
- Silicone-based O-Ring Compound (Key B)
- White Petroleum Grease (Key C)

## MAINTENANCE (Continued)

### SHAFT SEAL MAINTENANCE (Continued)

**Follower Shaft Seal (Outboard Seal)**

**Disassembly (See Figure 5)**

1. Remove the outboard seal carrier nuts (Key 3).
2. Remove the outboard seal carrier (Key 6). **Note:** The seal carrier o-ring (Key 7) may stick to the seal carrier and get removed at the same time (Figure 5.1), remove the o-ring after.
3. Using a mechanics pick set, carefully remove the backup ring (Key 8) and seal ring (Key 9).
4. Inspect all parts for damage, including the follower shaft (Key 21), damaged shafts must be replaced or repaired to avoid leaks (See Page 12 for Disassembly Instructions). Replace any damaged parts with new parts as necessary.

**Follower Shaft Seal (Outboard Seal)**

**Reassembly (See Figure 5)**

1. Lubricate the seal ring (Key 9) with white petroleum grease (Key C) and install.
2. Lubricate the backup ring (Key 8) with white petroleum grease (Key C) and install.
3. Lubricate the seal carrier o-ring (Key 7) with silicone-based compound (Key B) and install it onto the outboard seal carrier (Key 6).
4. Find the locator pin (Key 22), install the seal carrier (Key 6) onto the follower shaft (Key 21) making sure that the locator pin is in alignment with the orientation hole in the seal carrier.
5. Apply anti-seize compound (Key A) to the threads of the seal carrier studs (Key 4).
6. Thread the seal carrier nuts (Key 3) onto the seal carrier studs (Key 4) and tighten the nuts according to the torque requirements in Table 7 (Page 28).

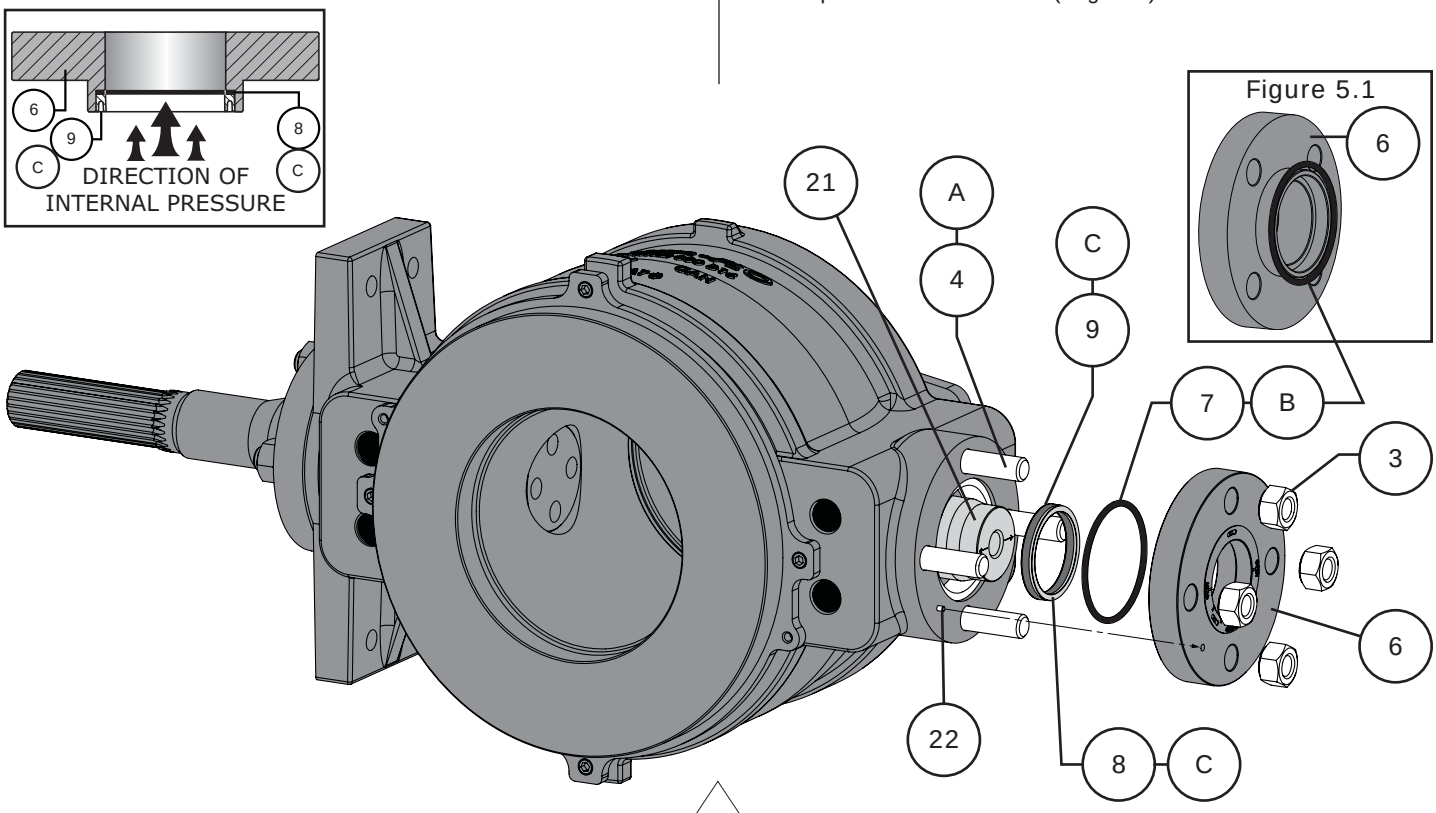



**Figure 5** *Follower Shaft Seal (Outboard Seal) Maintenance Diagram*

## MAINTENANCE (Continued)

### SHAFT SEAL MAINTENANCE (Continued)

**Drive Shaft Seal (Inboard Seal)**

**Disassembly (See Figure 6)**

**1** Remove the actuator (See Page 12 for Actuator Removal instructions).

**2** Remove the inboard seal carrier nuts (Key 3).

**3** Remove the inboard seal carrier (Key 5). **Note:** The seal carrier o-ring (Key 7) may stick to the seal carrier and get removed at the same time (Figure 6.1), remove the o-ring after.

**4** Using a mechanics pick set, carefully remove the backup ring (Key 8) and seal ring (Key 9).

**5** Inspect all parts for damage, including the drive shaft (Key 17), damaged shafts must be replaced or repaired to avoid leaks (See Page 12 for Disassembly Instructions). Replace any damaged parts with new parts as necessary.

**Reassembly (See Figure 6)**

**1** Lubricate the seal ring (Key 9) with white petroleum grease (Key C) and install.

**2** Lubricate the backup ring (Key 8) with white petroleum grease (Key C) and install.

**3** Lubricate the seal carrier o-ring (Key 7) with silicone-based compound (Key B) and install it onto the inboard seal carrier (Key 5).

**4** Install the seal carrier (Key 5) over the drive shaft (Key 17) and into the bore.

**5** Apply anti-seize compound (Key A) to the threads of the seal carrier studs (Key 4).

**6** Thread the seal carrier nuts (Key 3) onto the seal carrier studs (Key 4) and tighten the nuts according to the torque requirements in Table 7 (Page 28).

**7** Re-mount the actuator to the valve. See the Actuator Mounting instructions on Page 25, refer to the appropriate actuator instruction manual for more information.

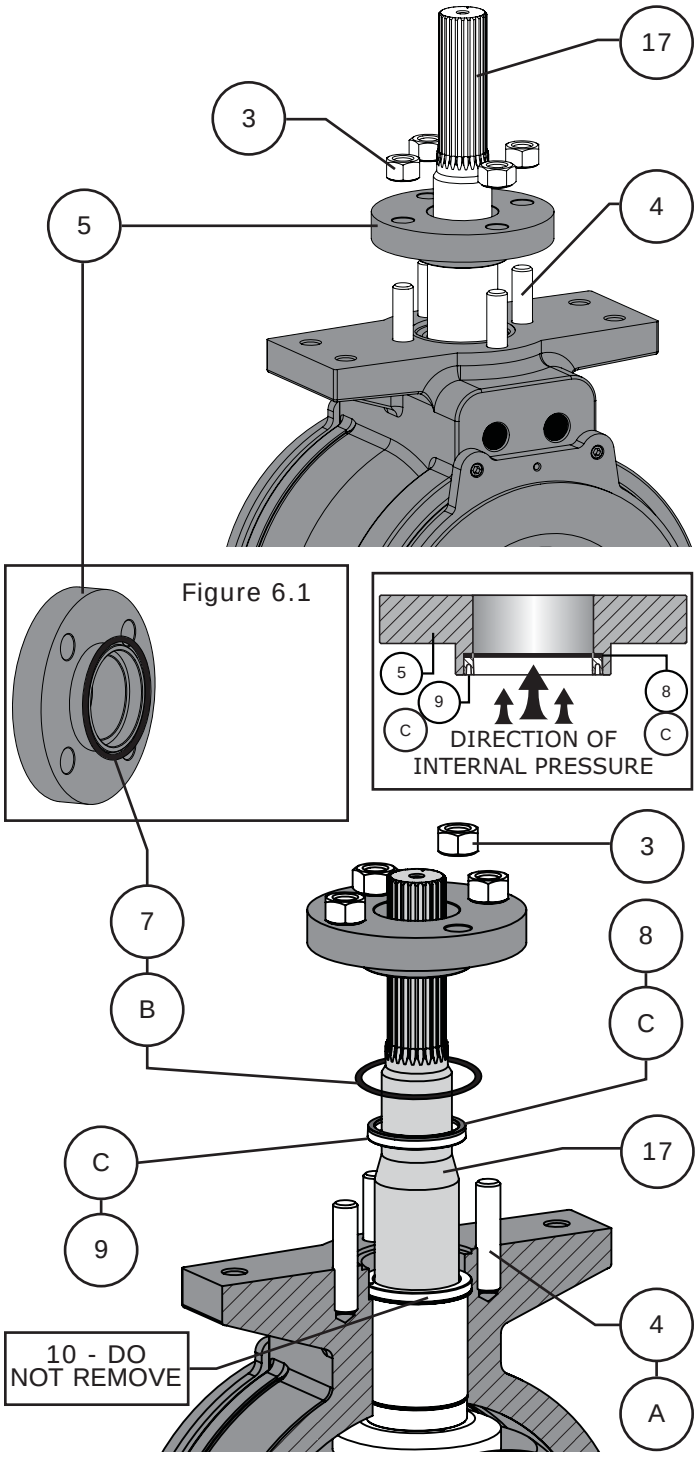



**Figure 6** *Drive Shaft Seal (Inboard Seal) Maintenance Diagram*

## MAINTENANCE (Continued)

### BALL SEAL MAINTENANCE

**Before You Begin:**

- Read Safety Caution (Page 2).
- Refer to Maintenance Notes (Page 8).

**Disassembly (See Figure 7)**

**1** If the valve is still in-line, make sure that the valve is in the OPEN position before it is removed from the pipe line. Remove the valve from pipe line.

**2** Remove seal protector ring cap screws (Key 25).

**3** Remove the seal protector ring (Key 26).

**4** Remove the seal protector ring o-ring (Key 29).

**5** Remove the ball seal (Key 30).

**6** Remove the shims (Key 31).

**7** For Dual Seal construction, repeat Steps 2 to 6 above for the opposite side of the valve.

**8** Inspect all parts (especially sealing surfaces) for damage, replace parts with new parts as necessary.

**Reassembly (See Figure 7)**

**Note:** If the ball seal (Key 30) was damaged and replaced, it will be necessary to re-adjust the ball deflection of the valve. Ball seal repair kits will included extra shims for adjustment purposes. For instructions on Ball Deflection see Step 18 of Ball and Shaft Assembly on Page 20.

**1** Place the shims (Key 31) over the ball (Key 2).

**2** Set the ball seal (Key 30) over the ball (Key 2), make sure it is centered.

**3** Lubricate the seal protector o-ring (Key 29) with silicone-based o-ring compound (Key B) and place it in the valve.

**4** The seal protector ring (Key 26) is equipped with threaded holes to attached eye hooks for lifting. Carefully lift and lower the seal protector ring into position.

**5** Install the seal protector cap screws (Key 25) and tighten them evenly in a crisscross pattern until snug.

**6** For Dual Seal construction, repeat Steps 1 to 5 above for the other side of the valve.

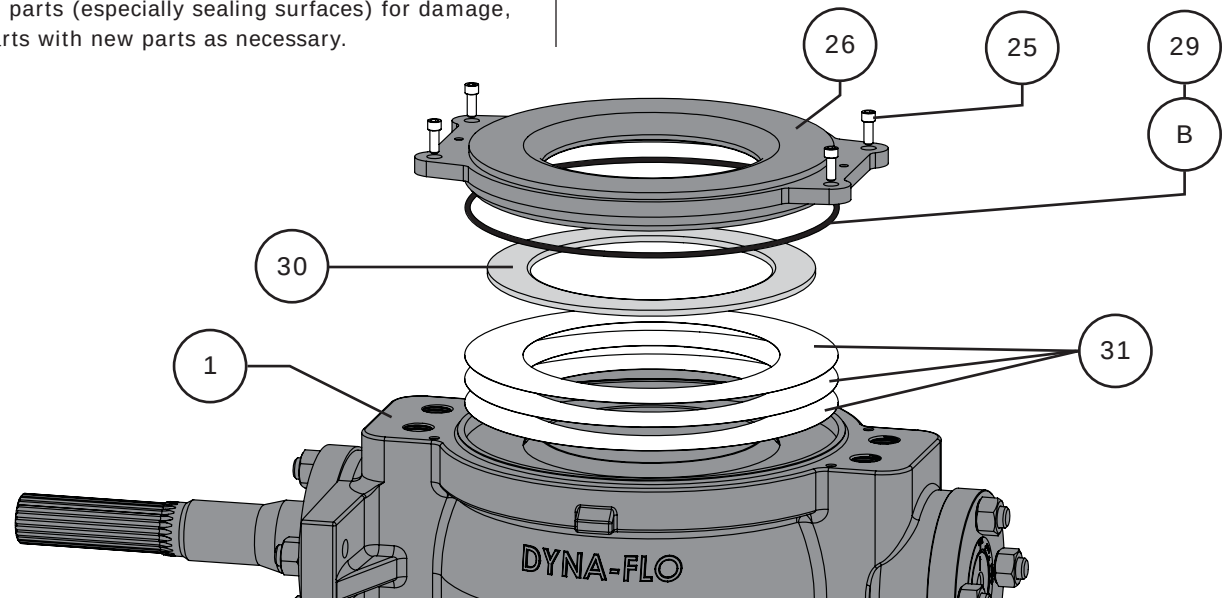



**Figure 7** *Ball Seal Maintenance Diagram*

## ACTUATOR REMOVAL

**Note:** Actuator removal does not require that the valve be removed from the pipeline.

**Before You Begin:**

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Disconnect supply lines (air or gas), electric power, or control signal to the actuator. Sudden movement of actuator can cause damage or injury, make sure actuator will not operate.
- Vent any pneumatic actuator loading pressure and relieve any actuator spring preload if present.

**Removal Steps:**

**1** Refer to the appropriate actuator instruction manual for more information regarding the actuator being removed.

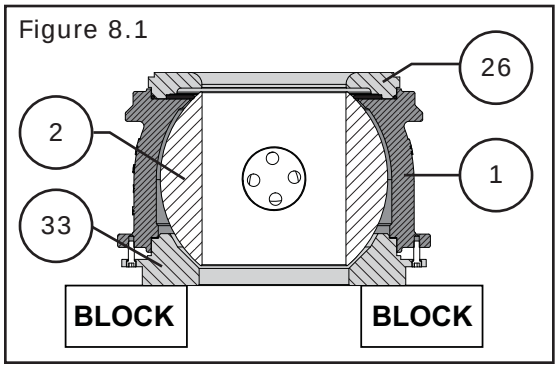
**2** If the valve has been removed from the pipeline, place the valve assembly on a flat work surface that can support the weight. It helps to have block placed under the valve to raise the valve off the work surface and allow for free ball movement (See Figure 8.1).

**3** The actuator lever is clamped onto the valve shaft (Key 17), loosen the actuator lever (Key G) by loosening the lever cap screw (Key F).

**4** Support the actuator and remove the actuator mounting bolts (Key 50).

**5** Separate the valve and actuator. Sometimes the actuator lever will bind on the valve shaft. Use caution when removing the actuator, forceful removal could damage the valve and actuator or cause the valve ball (Key 2) to be moved off center.

Figure 8.1

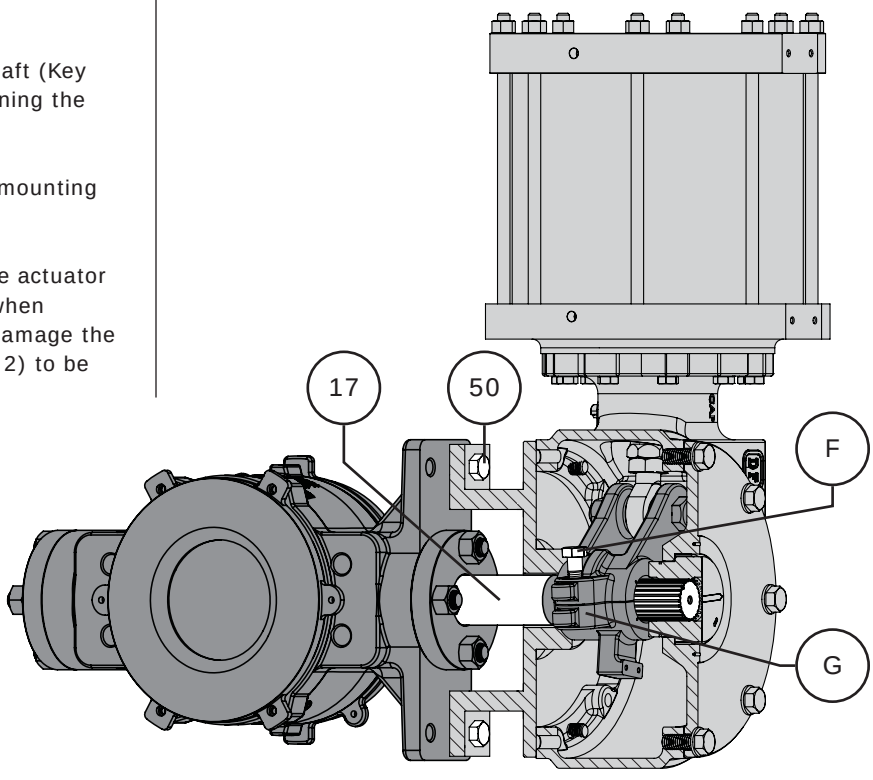



## DISASSEMBLY

**Before You Begin:**

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Remove the actuator from the valve (See Actuator Removal Instructions, Page 12).
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve. Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. For dual seal valves, relieve internal pressure by removing the pipe plug (Key 37).
- Remove the valve from pipeline, when removing the valve from pipe line be sure it is in the OPEN position, verify the valve is open using the indicator scale (Key 24) before removing from line.

**Figure 8** *Actuator Removal Example*



## DISASSEMBLY (Continued)

### BODY OUTLET / SEAL PROTECTOR RING REMOVAL

(See Figure 9)

1 Remove the seal protector ring cap screws (Key 25).

2 Carefully remove the seal protector ring (Key 26). The seal protector ring is equipped with threaded holes for lifting hooks, utilize these if possible.

3 Remove the seal protector o-ring (Key 29).

4 Remove the ball seal (Key 30).

5 Remove the shims (Key 31).

6 For Dual Seal construction, flip the valve body, repeat Steps 1 to 5 above. (See Figure 10)

**For Single Seal construction** (See Figure 9)

**A** Remove the cap screws (Key 32) from the body outlet (Key 33).

**B** Remove the body outlet (Key 33) and body outlet gasket (Key 34).

**For Dual Seal construction** (See Figure 10)

**A** Remove the adapter ring cap screws (Key 32).

**B** Remove the adapter ring (Key 36).

**C** Remove the body outlet (Key 33) and body outlet gasket (Key 34).

7 Inspect all parts and sealing surfaces for damage, replace or repair parts as necessary.

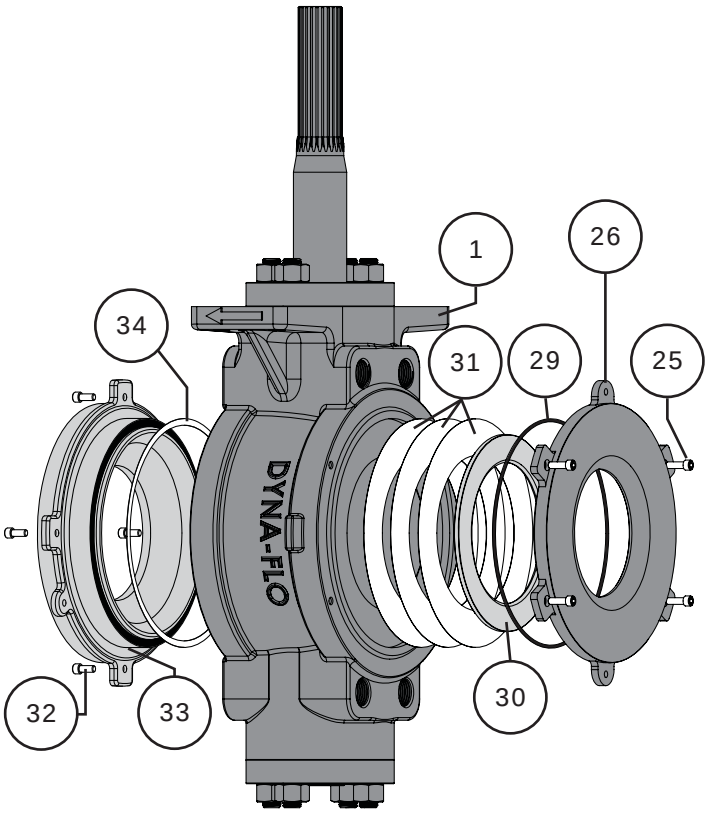



**Figure 9** *Typical Single Seal Valve Disassembly*

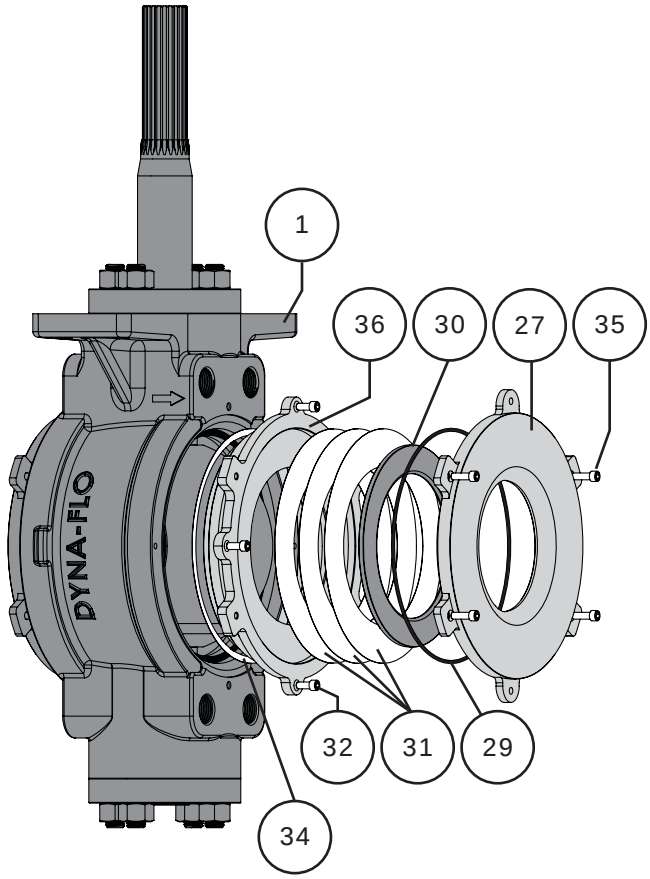



**Figure 10** *Typical Dual Seal Valve Disassembly*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## DISASSEMBLY (Continued)

### OUTBOARD SHAFT DISASSEMBLY (FOLLOWER SHAFT)

**Before You Begin:**

- Have the inlet side of the valve facing up on work surface.
- Place valve in the OPEN position.
- Refer to Figure 11.

**Special Tools Required:**

- Rubber mallet or soft block
- Appropriate ball support post if possible (See Table 9 and Figure 35).
- Shaft retainer (Key 16) removal tool (See Table 9 and Figure 35). Needed for Step 1 of Inboard Shaft Disassembly.

**Disassembly Steps:**

**1** For valves with Live Loaded Packing refer to Page 25. Remove the outboard seal carrier nuts (Key 3).

**2** Remove the outboard seal carrier (Key 6). **Note:** The seal carrier o-ring (Key 7) may stick to the seal carrier and get removed at the same time, remove the o-ring after.

**3** Remove the retainer screw (Key 20) from the follower shaft (Key 21). **Note:** it may be necessary to apply heat to the retainer screw in order to loosen the thread locking compound on the threads.

**4** Using a rubber mallet or soft block, carefully drive the follower shaft (Key 21) towards the inboard end of the valve until the split ring (Key 19) can be easily accessed.

**5** Remove the split ring (Key 19). **Note:** Split ring is two pieces.

**6** Temporarily support the ball (Key 2) and remove the follower shaft (Key 21). It is recommended that a ball support post be installed into the follower shaft bore to support the ball during Inboard (Drive) Shaft Disassembly.

**7** Remove the backup ring (Key 8) from the follower shaft (Key 21).

**8** Remove the seal ring (Key 9) from the follower shaft (Key 21).

**9** Remove the spacer (Key 10) from the follower shaft (Key 21).

**10** Remove the bushing spacer shims (Key 11) from the follower shaft (Key 21).

**11** Remove the bushing (Key 12) from the follower shaft (Key 21).

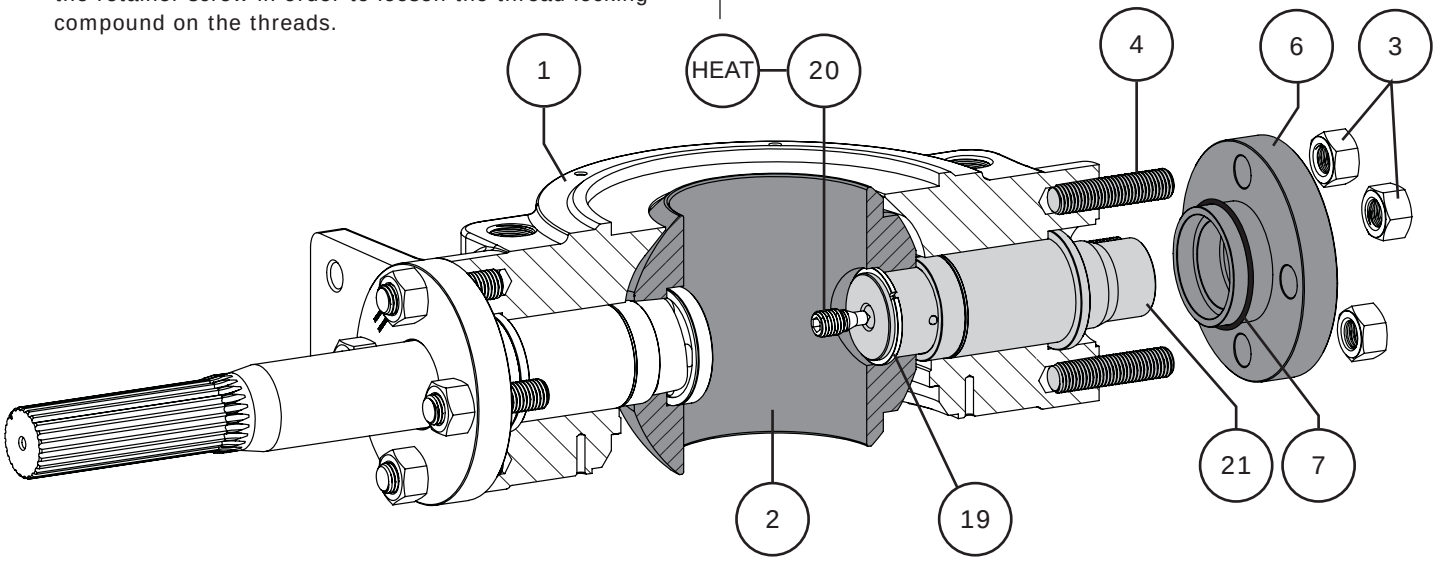



**Figure 11** *Outboard (Follower) Shaft Disassembly (Steps 1 - 3)*

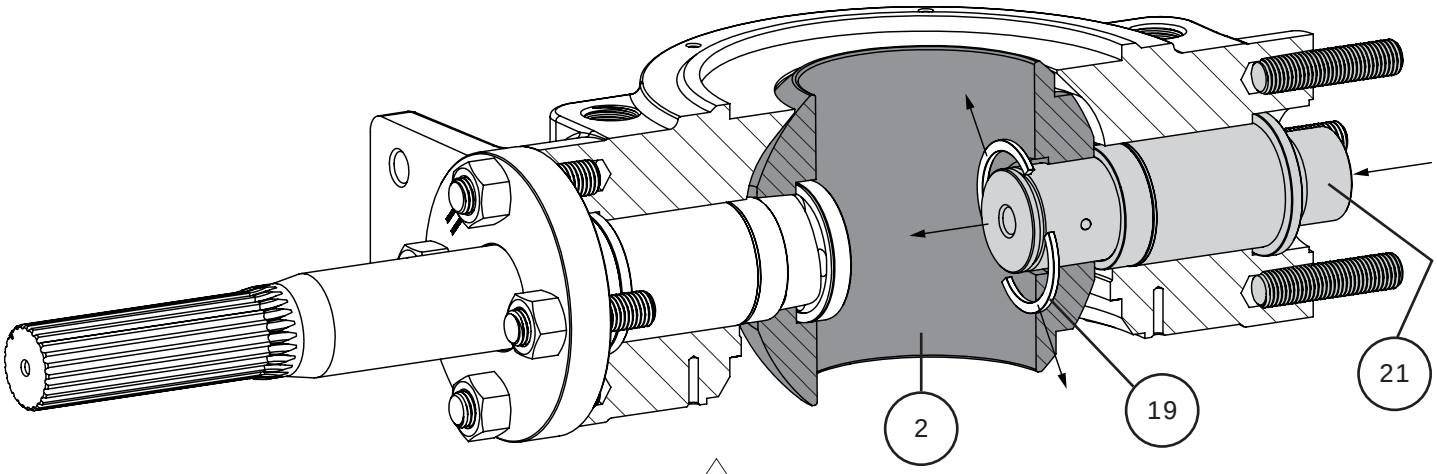



**Figure 12** *Outboard (Follower) Shaft Disassembly (Steps 4 - 6)*

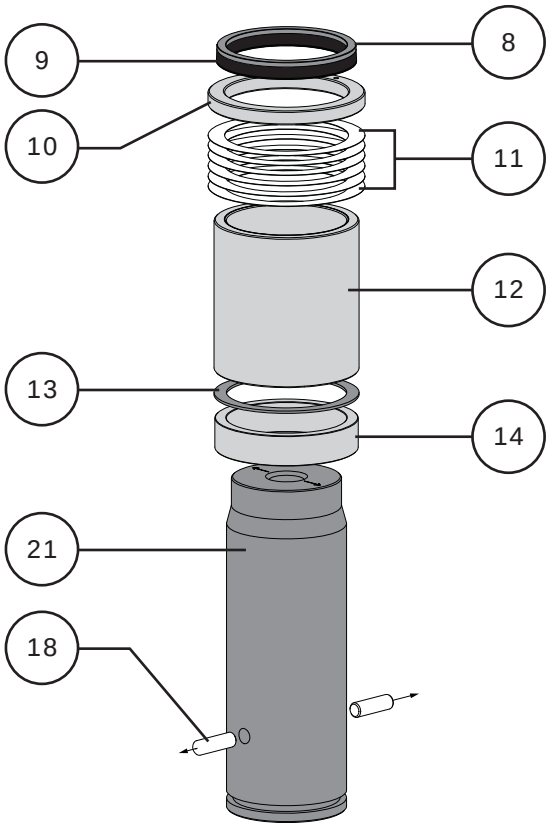



**Figure 13** *Follower Shaft Disassembly (Steps 7 - 13)*

## DISASSEMBLY (Continued)

### OUTBOARD SHAFT DISASSEMBLY (Continued)

**Disassembly Steps (Continued):**

**12** Remove the thrust washer (Key 13) from the follower shaft (Key 21).

**13** Remove the thrust spacer (Key 14) from the follower shaft (Key 21).

### INBOARD SHAFT DISASSEMBLY (DRIVE SHAFT)

**Disassembly Steps:**

**1** With the ball (Key 2) supported, remove the shaft retainer (Key 16). **Note:** it may be necessary to immobilize the valve shaft and apply heat to the shaft retainer to loosen the thread locking compound on the threads. A shaft retainer removal tool will be required.

**2** Remove the shaft retainer washer (Key 15).

**3** Remove the inboard seal carrier nuts (Key 3).

**4** Remove the inboard seal carrier (Key 5). **Note:** The seal carrier o-ring (Key 7) may stick to the seal carrier and get removed at the same time, remove the o-ring after.

**5** Support the valve ball (Key 2) with a sling to prevent damage.

**6** Remove the drive shaft (Key 17), light force may be required to dislodge the shaft from the polygon connection.

## DISASSEMBLY (Continued)

### INBOARD SHAFT DISASSEMBLY (Continued)

**Disassembly Steps (Continued):**

**7** Remove the backup ring (Key 8) from the drive shaft.

**8** Remove the seal ring (Key 9) from the drive shaft.

**9** Remove the spacer (Key 10) from the drive shaft.

**10** Remove the bushing spacer shims (Key 11) from the drive shaft.

**11** Remove the bushing (Key 12) from the drive shaft.

**12** Remove the thrust washer (Key 13) from the drive shaft.

**13** Remove the thrust spacer (Key 14) from the drive shaft.

**14** Continue to support the valve ball (Key 2) and remove the ball support post.

**15** Remove the valve ball (Key 2) from the body (Key 1).

**16** Inspect all parts for damage or wear, replace or repair parts as necessary. All soft parts such as seals and o-rings should be replaced.

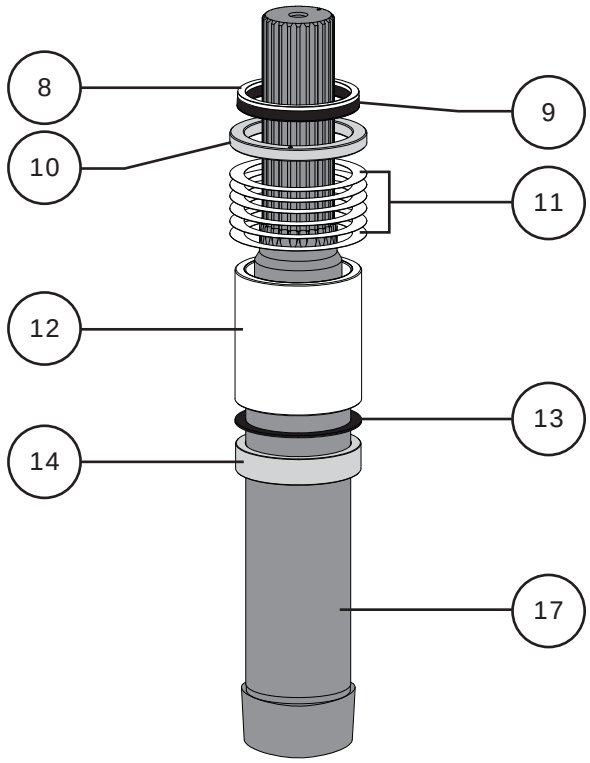



**Figure 15** *Drive Shaft Disassembly (Steps 7 - 13)*

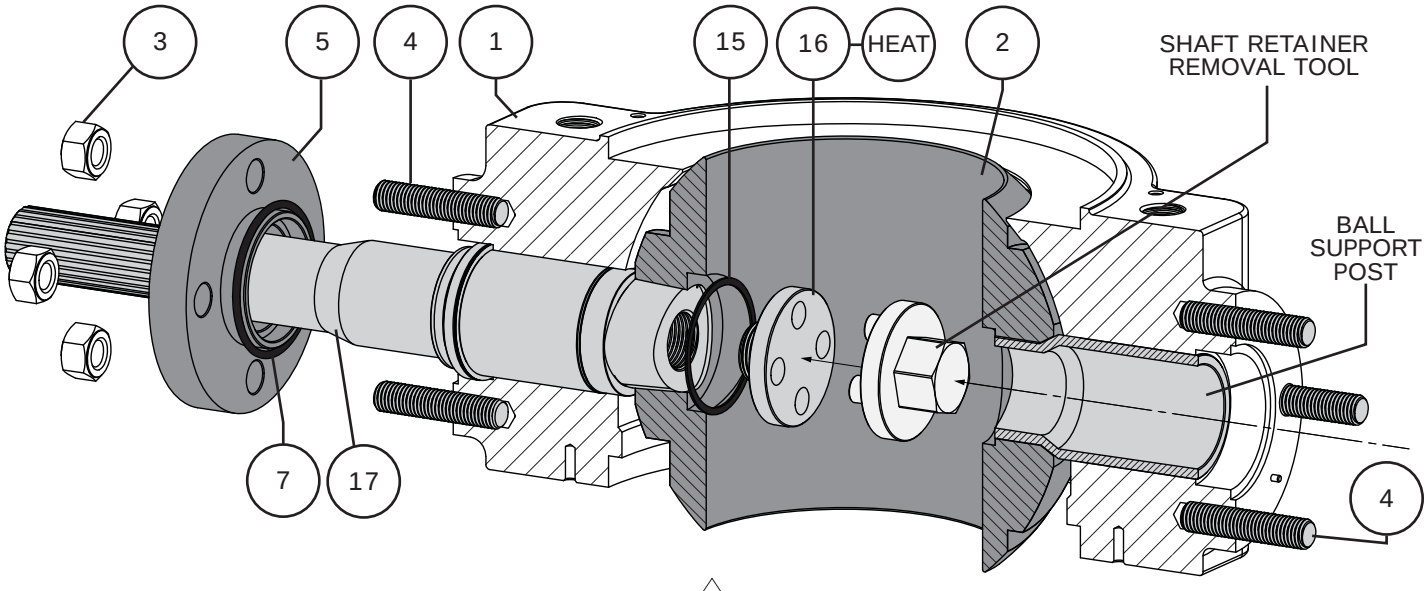



**Figure 14** *Inboard (Drive) Shaft Disassembly (Steps 1 - 4)*

## ASSEMBLY

**Before You Begin:**

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Clean and inspect all parts.
- Replace or repair damaged parts. Replace all soft parts (Seals, o-rings, gaskets, live loaded packing).

**Special Tools Required:**

- Rubber mallet or soft block
- Appropriate ball support post if possible (See Table 9 and Figure 35)
- Felt Marker
- Feeler Gauge

**Lubricants Required:**

- Anti-Seize Compound (Key A)
- Silicone-based O-Ring Compound (Key B)
- White Petroleum Grease (Key C)
- Medium Strength Thread Locking Compound (Key D)

### STUD INSTALLATION

**1** If the studs (Key 4) were replaced, removed, or never installed, apply anti-seize compound (Key A) to the threads of the end of the stud without a material stamp.

**2** Thread the studs (Key 4) into the valve body (Key 1) anti-seize coated end first until they are completely threaded into the valve body.

### BALL AND SHAFT ASSEMBLY

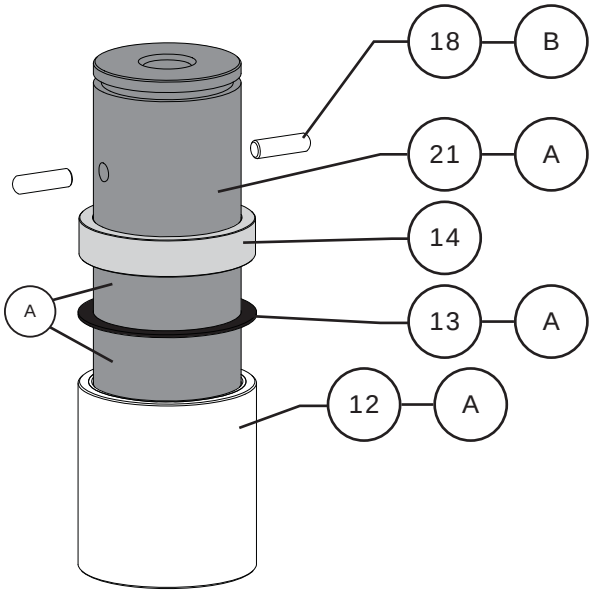
**1** Using a felt marker, mark the position of the pin holes of the follower shaft (Key 21) on the bottom and top of the follower shaft for future reference.

**2** Apply anti-seize compound (Key A) to the seal parts portion of the drive shaft (Key 17) and follower shaft (Key 21).

**3** Apply anti-seize compound (Key A) to both faces of the thrust washer (Key 13) and to the outside surface of the bushing (Key 12) (times 2 for the other shaft parts).

**4** Install the thrust spacer (Key 14), thrust washer (Key 13), and bushing (Key 12) onto the drive shaft (Key 17) and follower shaft (Key 21) as shown in Figures 16 & 17.

**5** Set assembled shafts aside.



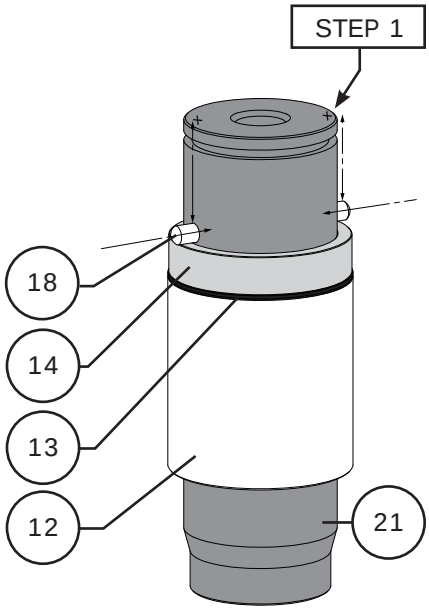




**Figure 16** *Outboard (Follower) Shaft Assembly*

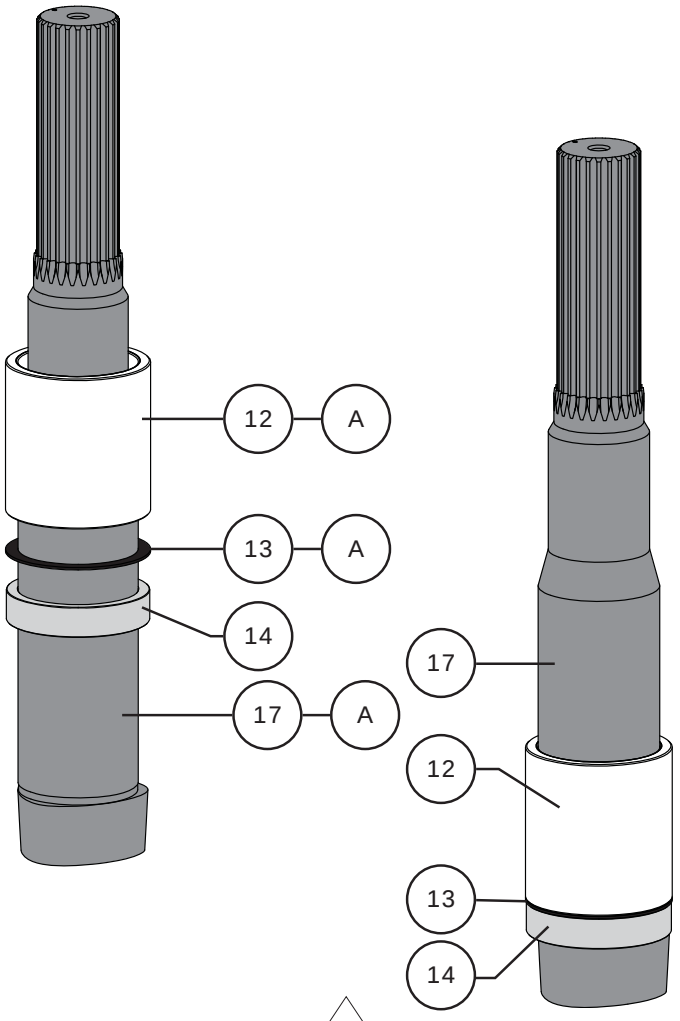



**Figure 17** *Inboard (Drive) Shaft Assembly*

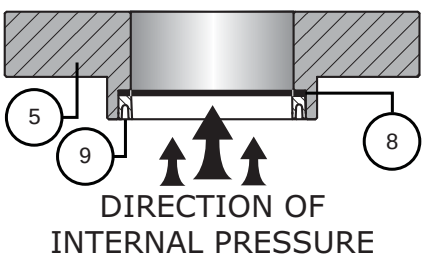



**Figure 18** *Seal Ring Orientation Diagram (Step 18)*

## **ASSEMBLY** (Continued)

**BALL AND SHAFT ASSEMBLY** (Continued)

**6** Place the valve body (outlet side up) onto blocks (see Figure 19 for block placement) on a flat work surface that can support the full assembled valve weight.

**7** Using slings, carefully insert the ball (Key 2) into the outlet side of the valve body (Key 1).

**8** Continue to support the valve ball (Key 2) and insert the appropriate ball support post (See Table 9 & Figure 35) if available.

**9** Insert the drive shaft assembly (Figure 17) into the valve and align the positioning marks of the drive shaft (Key 17) and polygon connection on the ball (Key 2). See Figure 20.

**10** Apply anti-seize compound (Key A) to the shaft retainer washer (Key 15) and insert it into the shaft bore of the ball (Key 2). See Figure 21.

**11** Apply medium strength thread locking compound (Key D) to the threads of the shaft retainer (Key 16). Thread the shaft retainer into the drive shaft (Key 17) till hand tight. Immobilize the drive shaft and tighten the shaft retainer to the appropriate torque value (See Table 8) using the shaft retainer removal tool (see Table 9 and Figure 35 for tool dimensions). See Figure 21.

**12** Support the ball (Key 2), remove the ball support post.

**13** Apply silicone-base o-ring compound to the pins (Key 18). Install the pins into the pin holes of the follower shaft (Key 21) flat end first and only in far enough to be able to slide through the bushing (see Figure 16). **Note:** The silicone-based compound will help keep the pins in place during assembly. Refer to the marks made on the follower shaft (Key 21) during Step 1 to help align the pins with the pin grooves on the valve ball (Key 2).

**14** Install the outboard (follower) shaft assembly (Figure 16) into the valve body assembly. Push the shaft assembly into the valve far enough that the split ring (Key 19) groove on the follower shaft (Key 21) is visible on the inside of the valve ball (Key 2). See Figure 22.

**15** Install the split ring (Key 19) and push the follower shaft assembly back out of the valve until it stops in place. See Figure 22.

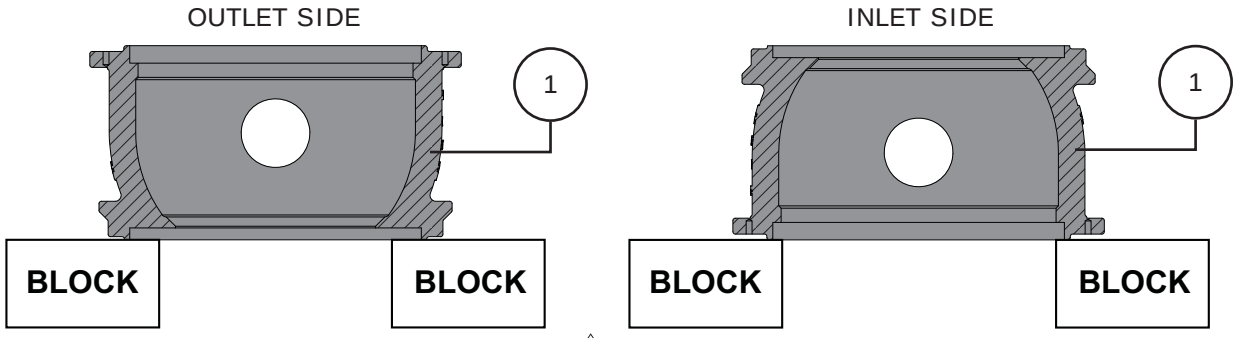
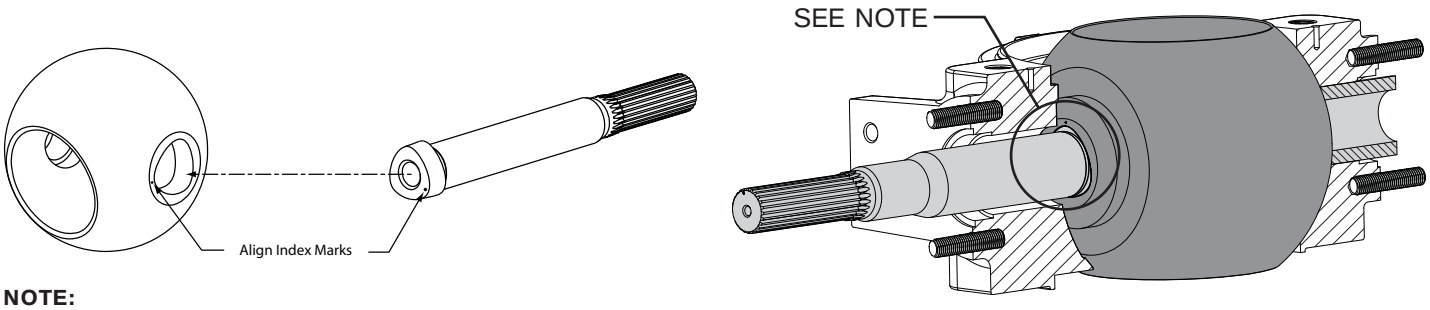



**Figure 19** *Support Block Placement (Step 6)*




**NOTE:**

For rare circumstances when the alignment mark is not visible (on the 10 inch ball for example), move the ball into the fully open position inside the valve body and insert the tapered polygon end connection of the shaft into the ball so that the alignment mark of the shaft polygon is placed into the corner of the ball polygon that faces the open end of the valve ball (parallel to the flow bore of the valve).

**Figure 20** *Proper Polygon to Shaft Alignment Index Marks (Step 9)*

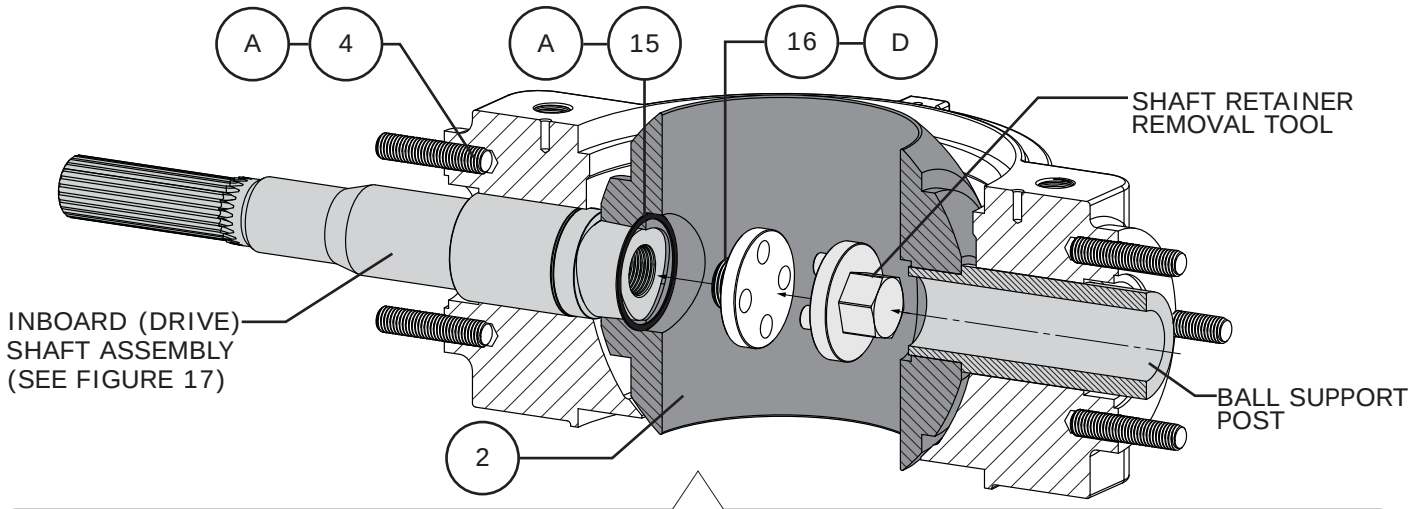



**Figure 21** *Inboard (Drive) Shaft Installation (Steps 9 - 11)*

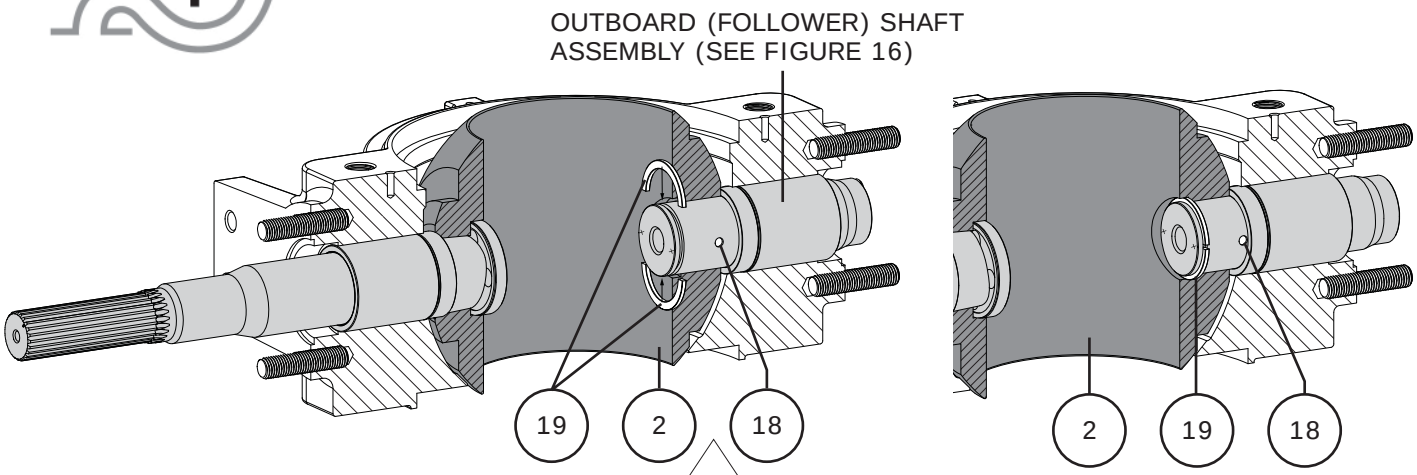



**Figure 22** *Outboard (Follower) Shaft Installation (Steps 14 - 15)*

## ASSEMBLY (Continued)

**BALL AND SHAFT ASSEMBLY** (Continued)

**16** Apply medium strength thread locking compound to the threads of the retainer screw (Key 20), thread the retainer screw into the follower shaft (Key 21) until the face of the retainer screw is flush with the face of the ball (Key 2). If installed properly, the pins (Key 18) will engage and slide into the pin grooves of the ball (Key 2). See Figure 23.

**17** Flip the valve assembly (See Figure 19 for support block placement on outlet side of valve body).

**18** Install 6 shims (Key 11) into the outboard (follower) shaft bore of the valve body (Key 1). Temporarily install the spacer (Key 14), seal ring (Key 9), and backup ring (Key 8) (see Figure 18 for seal ring orientation). Install the seal carrier (Key 6) and nuts (Key 3) **Note:** See Figure 5 for locator pin (Key 22) alignment. Tighten the seal carrier nuts completely but DO NOT TORQUE them into place. **Note:** For Live Loaded Packing just temporarily install the live loaded packing box (Key 48) instead of the seal carrier.

**19** Push the drive shaft (Key 17) towards the follower shaft (Key 21) in an attempt to center the valve ball (Key 2). Using a feeler gauge, measure the gap between the valve body (Key 1) and valve ball (Key 2) on both the inboard and outboard sides. The gap between the valve ball and valve body should be even on both ends, the maximum deviation of the gap should be no more than 0.005 inches (0.127 mm), see Figure 25.

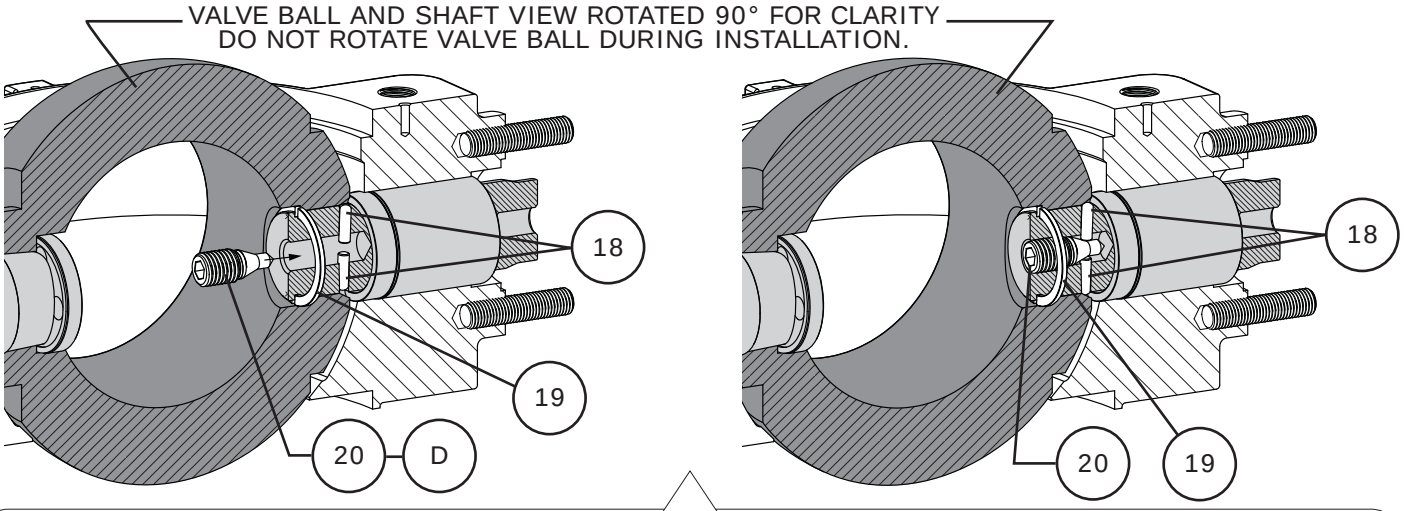



**Figure 23** *Outboard (Follower) Shaft Installation (Step 16)*

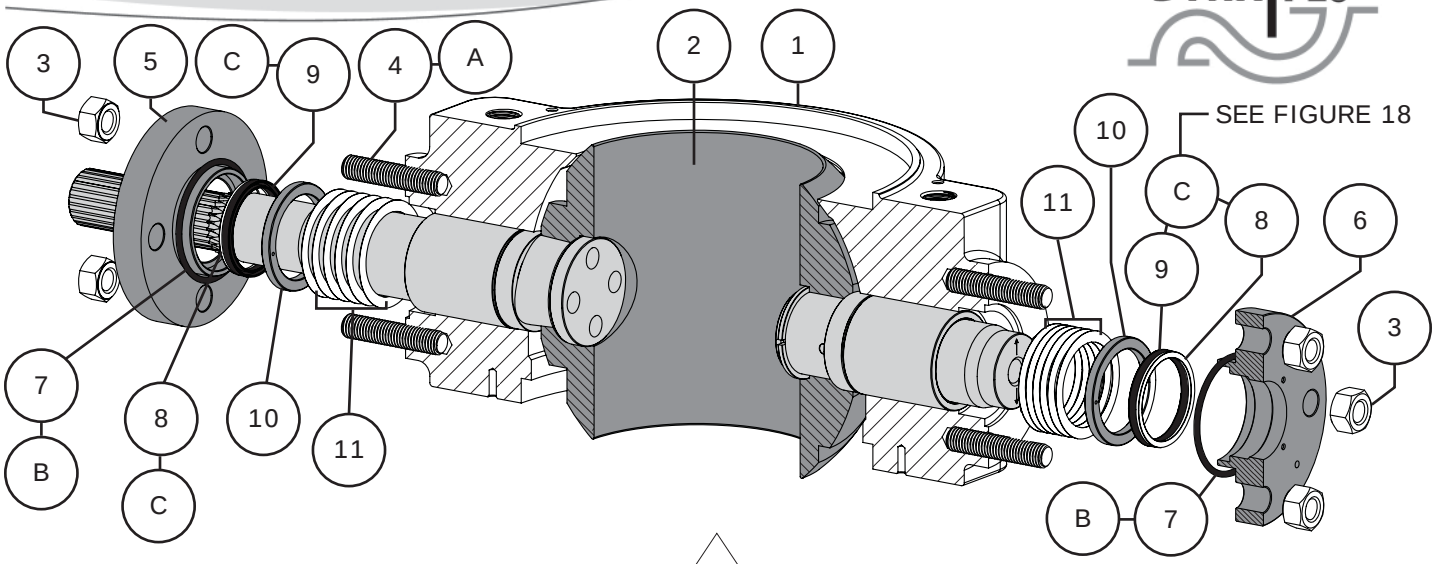



**Figure 24** *Shaft Seal Installation Diagram (Step 18 - 29)*

## ASSEMBLY (Continued)

**BALL AND SHAFT ASSEMBLY** (Continued)

**20** Shims (Key 11) are 0.010 inches (0.254 mm) thick, once the gap has been measured the number of shims may need to be adjusted to center the ball (Key 2). Remove the seal carrier (Key 6), seal ring (Key 9), backup ring (Key 8), and spacer (Key 10). Using a mechanics pick set, add or remove shims as necessary to center the valve ball.

**21** Repeat Steps 18 to 20 as necessary until the ball (Key 2) is centered. Once centered, remove the spacer (Key 10), seal ring (Key 9), and backup ring (Key 8). Apply white petroleum grease (Key C) to the seal ring and backup ring, re-install the spacer, seal ring, and backup ring.

**22** Apply silicone-based o-ring compound (Key B) to the o-ring (Key 7) and install the o-ring. Install the seal carrier (Key 6).

**23** Apply anti-seize compound to the top of the threads of the studs (Key 4) and tighten the nuts (Key 3) down onto the seal carrier (Key 6) until the proper torque is reached (See Table 7 for torque values).

**24** Install 6 shims (Key 11) into the inboard (drive) shaft bore. Temporarily install the spacer (Key 10), seal ring (Key 9), and backup ring (Key 8) (see Figure 18 for seal ring orientation). Install the seal carrier (Key 5) **Note:** There should be enough shims in place so that when the seal carrier is installed the contact between the valve body (Key 1) and seal carrier is broken. If there is contact between the valve body and seal carrier, install more shims.

**25** Install and tighten the seal carrier nuts (Key 3), DO NOT TORQUE the nuts into place. The valve shaft and ball should no longer be able to rotate freely once the nuts are tightened.

**26** Remove the seal carrier nuts (Key 3), seal carrier (Key 5), backup ring (Key 8), seal ring (Key 9), and spacer (Key 10) then begin by removing 1 shim (Key 11). Repeat Step 25 and continue repeating this step, removing 1 shim at a time until the valve shaft and ball rotate freely after the seal carrier nuts have been tightened.

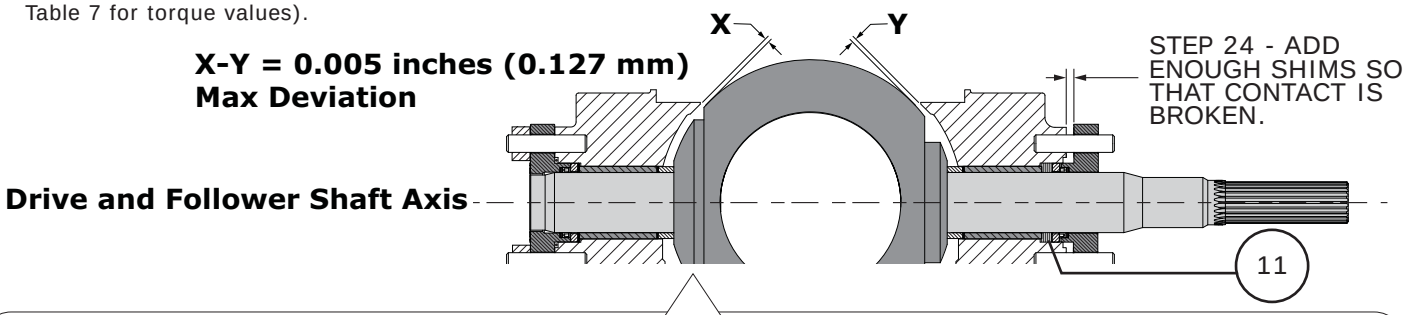



**Figure 25** *Ball to Body Centering Tolerance Diagram (Step 16 & 24)*

## ASSEMBLY (Continued)

**BALL AND SHAFT ASSEMBLY** (Continued)

**27** Once the valve shaft and ball are able to rotate freely while the seal carrier is tightened in place. Remove the seal carrier nuts (Key 3) and seal carrier (Key 5).

**28** Remove the backup ring (Key 8) and seal ring (Key 9). Apply white petroleum grease (Key C) to both the backup ring and seal ring and then re-install them.

**29** Apply silicone-based o-ring compound (Key B) to the o-ring (Key 7) and install it. Apply anti-seize compound (Key A) to the top of the threads of the studs (Key 4).

**30** Install the seal carrier (Key 5) and thread the seal carrier nuts (Key 3) into place. Torque the seal carrier nuts to the torque recommended in Table 7.

**BALL SEAL INSTALLATION**

**Before You Begin:**

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Clean and inspect all parts.
- Replace or repair damaged parts. Replace all soft parts (Seals, o-rings, gaskets, live loaded packing).

**Lubricants Required:**

- Anti-seize compound (Key A)
- Silicone-based o-ring compound (Key B)
- White petroleum grease (Key C)

**1** Carefully rotate the valve ball (Key 2) to the closed position. Refer to Figure 19 for proper support block placement.

**2** Place 6 ball seal shims (Key 31) over the ball (Key 2) and on to the valve body (Key 1). See Figure 26.

**3** Place the ball seal (Key 30) on the shims (Key 31) and center the seal on the ball (Key 2).

**4** Push down on the ball seal (Key 30), while being pressed upon the ball seal should make firm contact with the ball (Key 2). Add or remove shims as necessary to achieve firm contact between the ball and seal. **Note:** Shims are 0.010 inches (0.25 mm) thick. See Figure 28.

**5** Remove the ball seal (Key 30) and remove 3 ball seal shims (Key 31). Return the ball seal to its position on the remaining ball seal shims.

**6** Apply silicone-based o-ring compound (Key B) to the seal protector o-ring (Key 29). Lay the o-ring into the valve body (Key 1) so that it rests on top of the shims (Key 31).

**7** Carefully install the seal protector ring (Key 26). The seal protector ring has threaded holes for lifting hooks, utilize lifting hooks to lower the seal protector ring into position if possible. DO NOT damage the valve ball (Key 2) when installing the seal protector ring.

**8** Apply anti-seize compound (Key A) to the threads of the seal protector ring cap screws (Key 25). Install the cap screws into the seal protector ring (Key 26) and tighten them evenly in a crisscross pattern.

**9** For Dual Seal Valve Construction (For Single Seal Construction proceed to Body Outlet Installation):

- After installing the first ball seal (Steps 1 – 8), flip the valve body.
- Refer to Figure 27.
- Install the adapter ring gasket (Key 34).
- Install the adapter ring (Key 36). **Note:** The adapter ring installs the same as the seal protector ring (Key 26) follow steps 7 & 8 above.
- Repeat Steps 1 to 8 above installing the second seal on to the adapter ring (Key 36).

**BODY OUTLET INSTALLATION**

**Before You Begin:**

- Read Safety Caution (Page 2).
- Read Before You Begin and Lubricants Required from Ball Seal Installation section.

**1** Flip the valve so the outlet side is up. Carefully rotate the valve ball (Key 2) in to the closed position. Refer to Figure 19 for proper support block placement.

**2** Install the gasket (Key 34).

**3** Carefully lift and lower the body outlet (Key 33) into position over top of the valve ball (Key 2). **Note:** The body outlet has threaded holes for lifting hooks, utilize lifting hooks to help install the body outlet if possible. DO NOT damage the valve ball during body outlet installation.

**4** Apply anti-seize compound (Key A) to the threads of the body outlet cap screws (Key 32). Install the cap screws into the body outlet (Key 33) and tighten them evenly in a crisscross pattern.

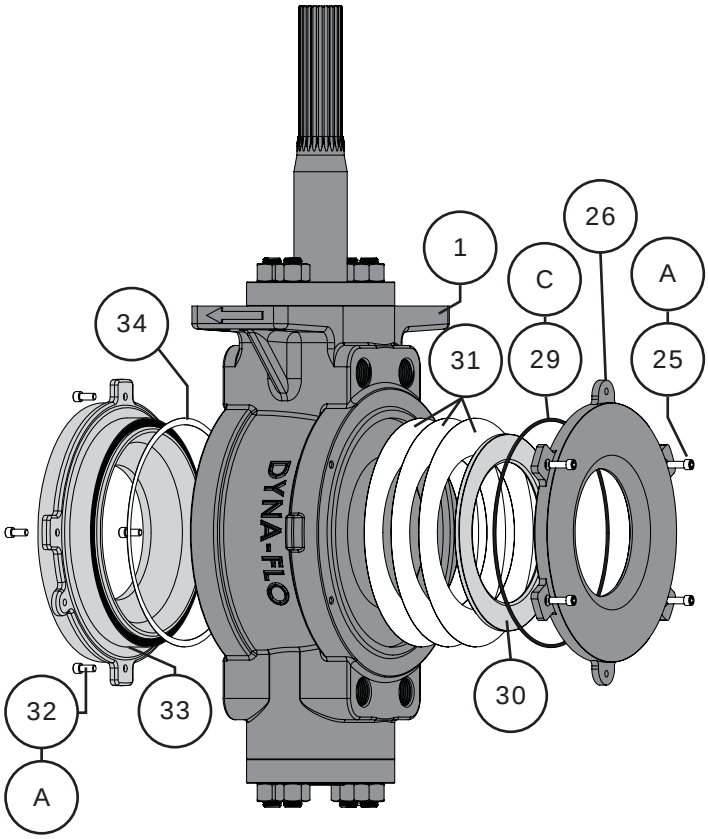



**Figure 26** *Typical Single Seal Valve Disassembly*

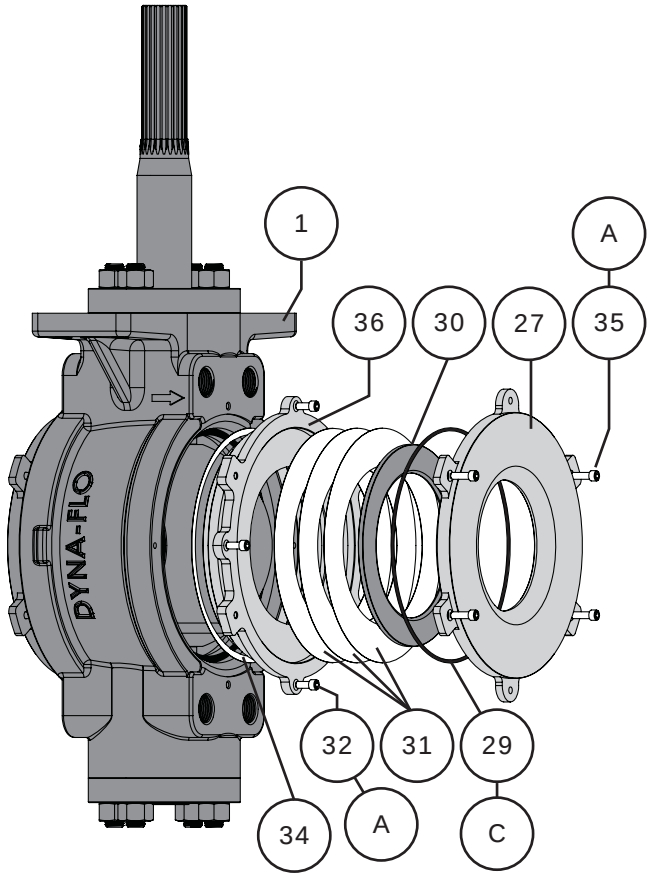



**Figure 27** *Typical Dual Seal Valve Disassembly*

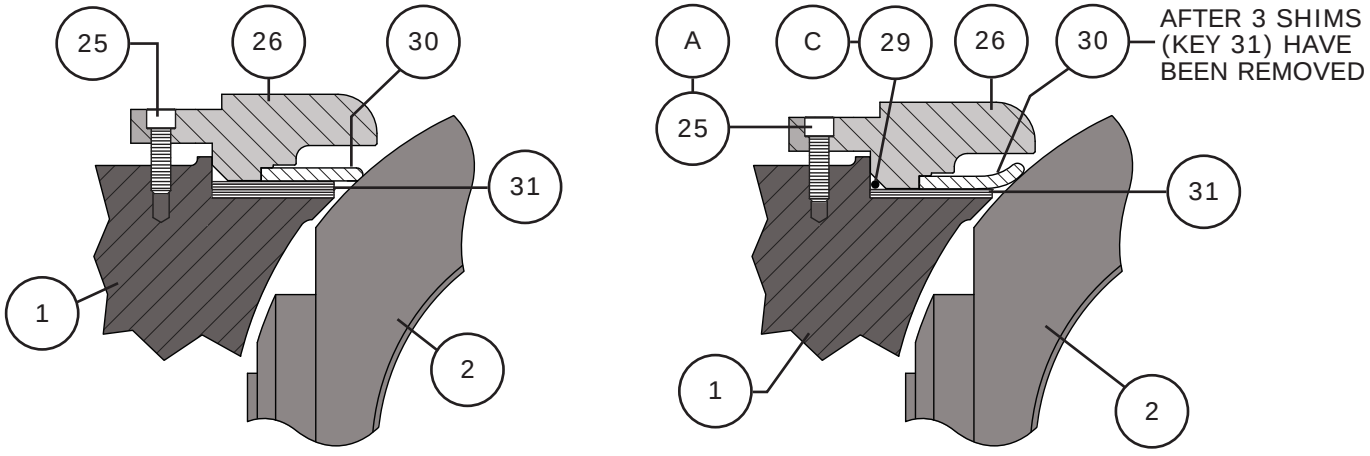



**Figure 28** *Proper Ball Seal and Shim Installation (Step 16)*

## ASSEMBLY (Continued)

### FLOW RING INSTALLATION

**Before You Begin:**

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Clean and inspect all parts.
- Replace or repair damaged parts. Replace all soft parts (Seals, o-rings, gaskets, live loaded packing).

**1** Flip the valve so that the outlet side is facing up. Carefully rotate the valve ball (Key 2) in to the closed position. Refer to Figure 19 for proper support block placement.

**2** Place 6 ball seal shims (Key 31) over the ball (Key 2) and on to the valve body (Key 1). See Figure 29.

**3** Carefully install the flow ring (Key 28). The flow ring has threaded holes for lifting hooks, utilize lifting hooks to lower the part into position if possible. DO NOT damage the valve ball (Key 2) when installing.

**4** Center the flow ring (Key 28) and temporarily install the cap screws (Key 25). Do not completely tighten the cap screws until the clearance between the ball (Key 2) and flow ring has been verified.

**5** Using a feeler gauge, measure the clearance between the ball (Key 2) and flow ring (Key 28). Clearance should measure:

- 0.020 inches (0.38 mm) for forward flow valves.
- 0.030 inches (0.76 mm) for reverse flow valves.

Add or subtract shims (Key 31) as necessary to achieve proper clearance.

**6** Once proper clearance has been achieved, apply silicone based o-ring compound (Key B) to the o-ring (Key 29) and install. Carefully re-install the flow ring (Key 28).

**7** Apply anti-seize compound (Key A) to the threads of the cap screws (Key 25) and thread them into the flow ring (Key 28). Completely tighten the cap screws using a crisscross pattern.

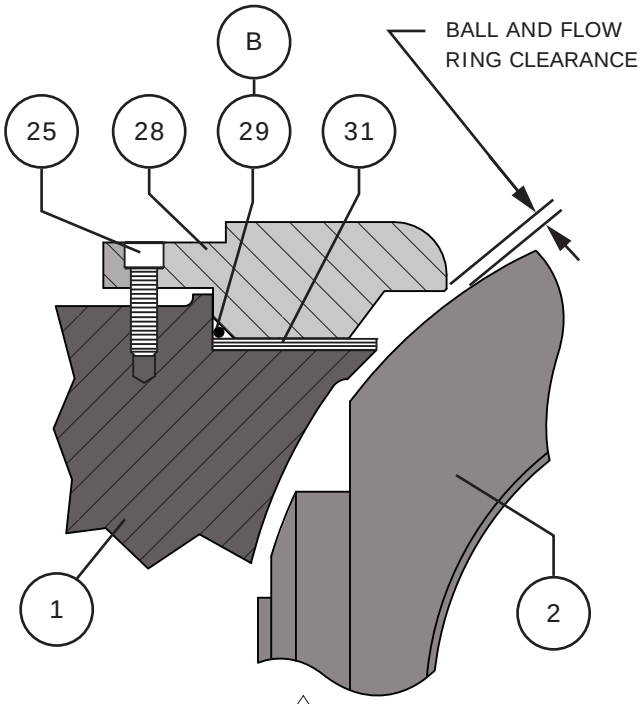



**Figure 29** *Flow Ring Assembly Diagram (Step 5)*

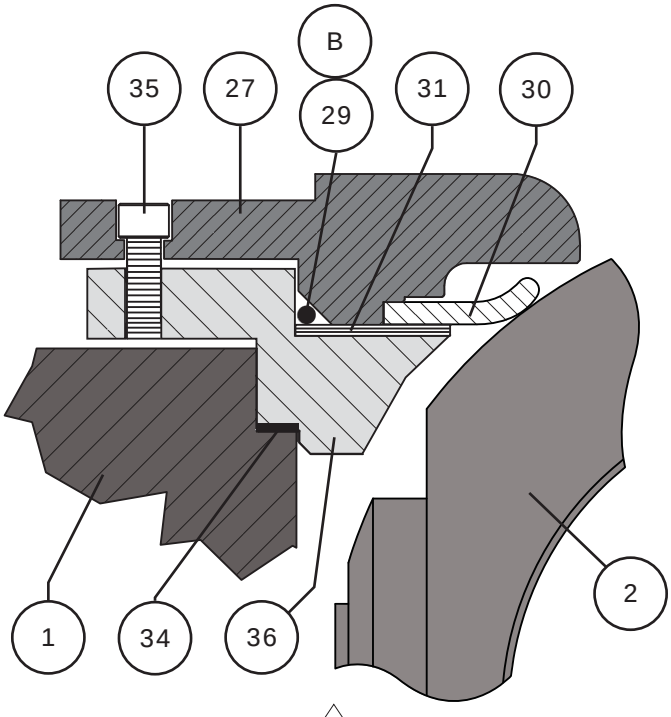



**Figure 30** *Typical Dual Seal Valve Disassembly*

## LIVE LOADED PACKING

### DISASSEMBLY

**Before You Begin:**

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Clean and inspect all parts.

**1** Remove the packing nuts (Key 38). Remove the packing flange (Key 41). Remove the packing flange o-ring (Key 42).

**2** Remove the spring washers (Key 43). **Note:** Record the number of spring washers, their order and orientation they were stacked in for re-assembly purposes.

**3** Remove the live loaded packing followers (Key 44 & 45).

**4** Remove the packing box nuts (Key 3). Remove the live loaded packing box (Key 49). **Note:** The o-ring (Key 7) may stick to the seal carrier during removal. Remove the o-ring (Key 7).

**5** Using a mechanics pick set, carefully remove the packing set (Key 47), anti-extrusion rings (Key 46), and packing box ring (Key 48) from inside the bore of the packing box (Key 49).

**6** For further valve disassembly refer to Step 3 of Outboard Shaft Disassembly on Page 14.

### ASSEMBLY

**Before You Begin:**

- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Clean and inspect all parts.
- Replace or repair damaged parts. Replace all soft parts (Seals, o-rings, gaskets, live loaded packing).
- If standard shaft seals are in place and Live Loaded Packing is being installed, it will be necessary to remove the standard seal carrier (Key 5 & 6), o-ring (Key 7), backup ring (Key 8), seal ring (Key 9), and spacer (Key 10) if they are in the way.

**Lubricants Required:**

- Anti-Seize Compound (Key A)
- Silicone-based O-Ring Compound (Key B)

**1** Apply silicone-based o-ring compound (Key B) to the seal carrier o-ring (Key 7). Install the o-ring.

**2** Install the live loaded packing box (Key 49).

**3** Apply anti-seize compound (Key A) to the threads of the studs (Key 4), thread the nuts (Key 3) on to the studs and torque them evenly in an alternating pattern to the torque specification in Table 7. **Note:** 12 inch valves use cap screws (Key 40) instead of studs and nuts.

**4** Apply anti-seize compound (Key A) to the bottom threads of the packing studs (Key 39). Thread the packing studs into the packing box (Key 49) so that the material stamp is still visible on top of the stud.

**5** Apply silicone-based o-ring compound (Key B) to the packing box ring (Key 48), live loaded packing set (Key 47), and anti-extrusion rings (Key 46). Stack the above mentioned parts as shown in Figures 31-34 and insert them into the packing box (Key 49). It is very important that no air become trapped between the packing box parts during installation, if necessary use the packing follower (Key 44 & 45) to push the packing into the packing box.

**6** Install the spring washers (Key 43) onto the packing follower (Key 44 or 45) in the order and orientation shown in Figures 31, 32, 33, and 34. Secure the spring washers in place using the packing flange o-ring (Key 42).

**7** Install the live loaded packing follower (Key 44 or 45 depending on inboard or outboard end) assembly. Install that packing flange (Key 41) and apply anti-seize compound (Key A) to the top threads of the packing studs (Key 39).

**8** Thread the packing flange nuts (Key 38) onto the studs (Key 39) and tighten them evenly in an alternating pattern (keeping the packing flange (Key 41) level while tightening) until the spring washers (Key 43) are completely compressed. Once completely compressed, loosen each packing nut a half turn (180 degrees).

## ACTUATOR MOUNTING

Refer to Figure 36 and the appropriate actuator instruction manual when mounting or changing actuator positions. Actuators may be either right or left hand mounted, Figure 36 shows the correct shaft to lever orientation for both configurations.

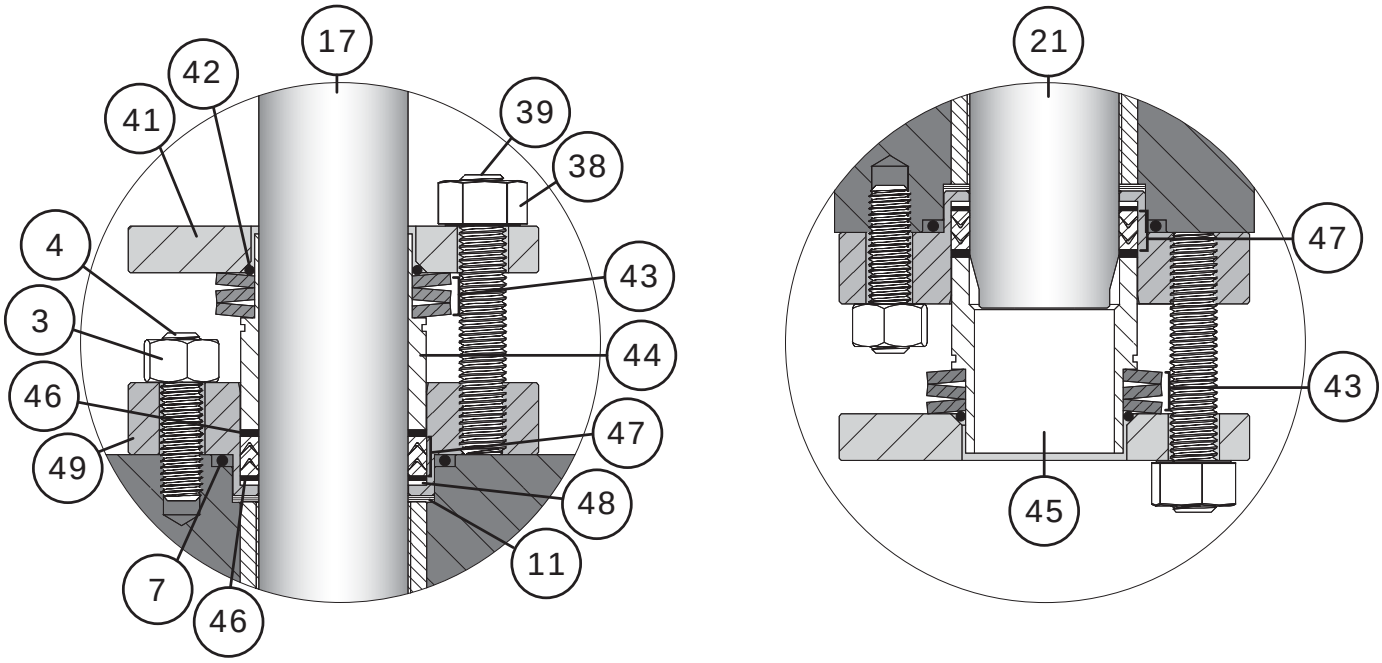



**Figure 31** *6 Inch Valve Inboard and Outboard Live Loaded Packing Arrangement*

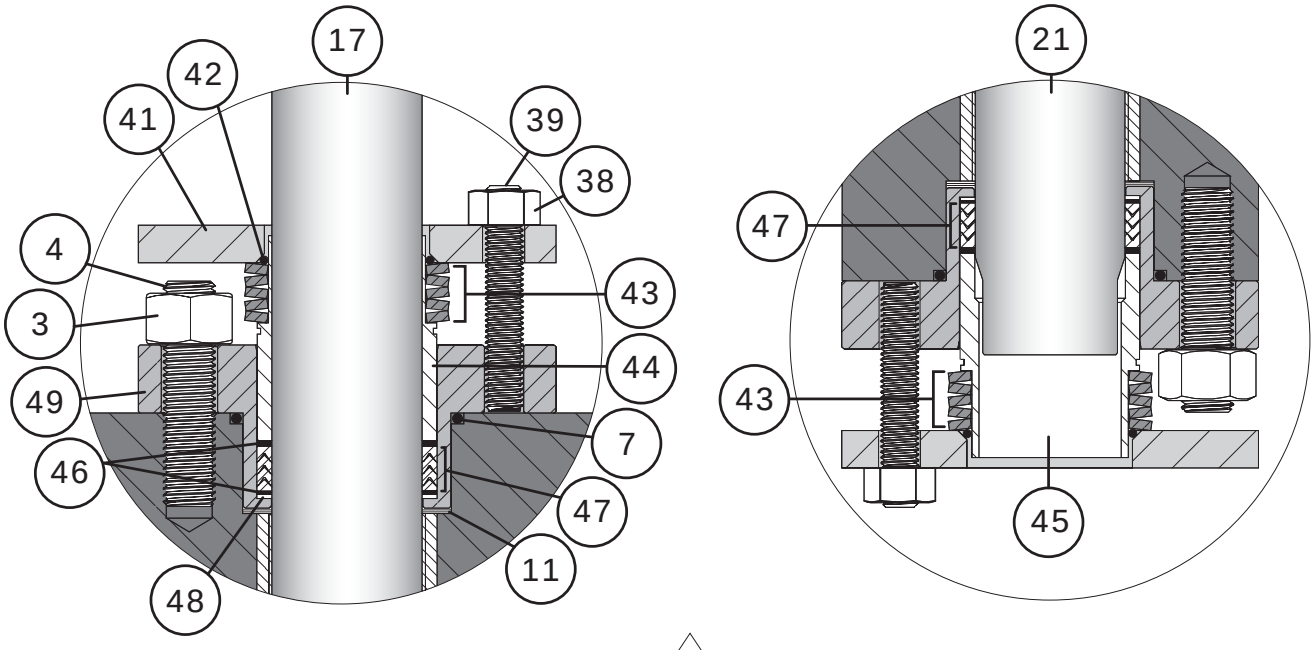



**Figure 32** *4 & 8 Inch Valve Inboard and Outboard Live Loaded Packing Arrangement*

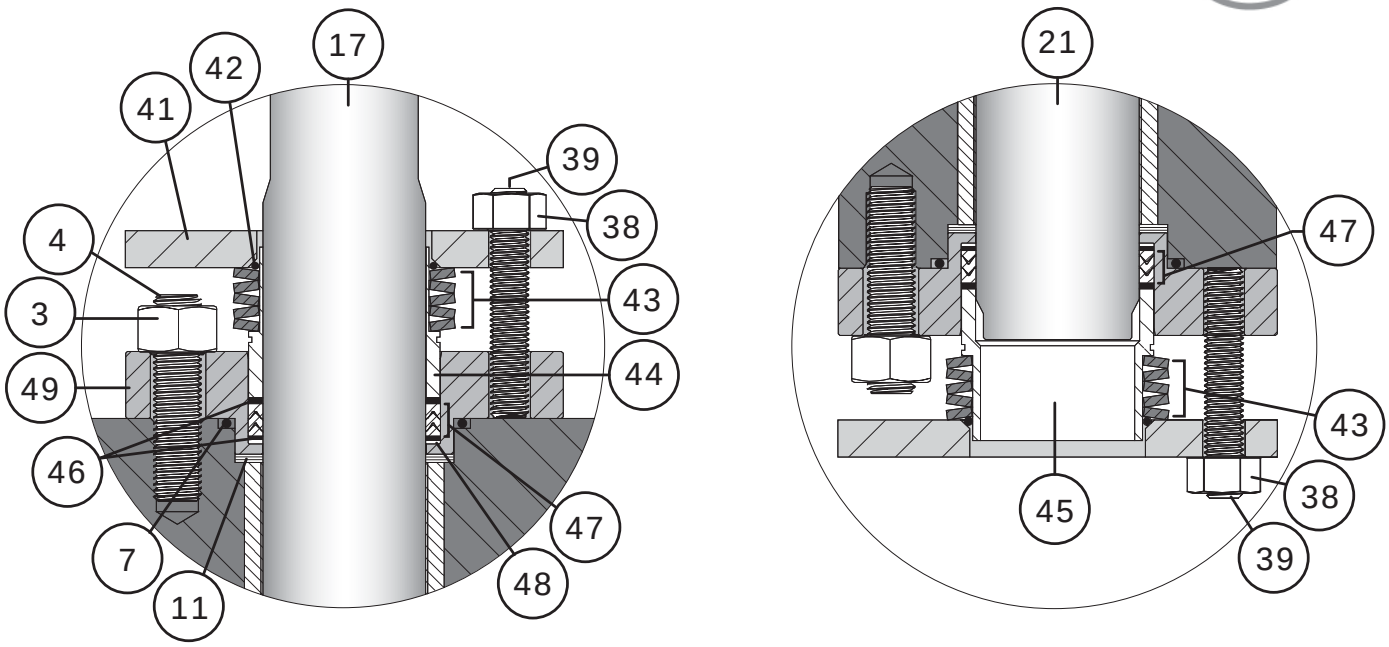



**Figure 33** *10 Inch Valve Inboard and Outboard Live Loaded Packing Arrangement*

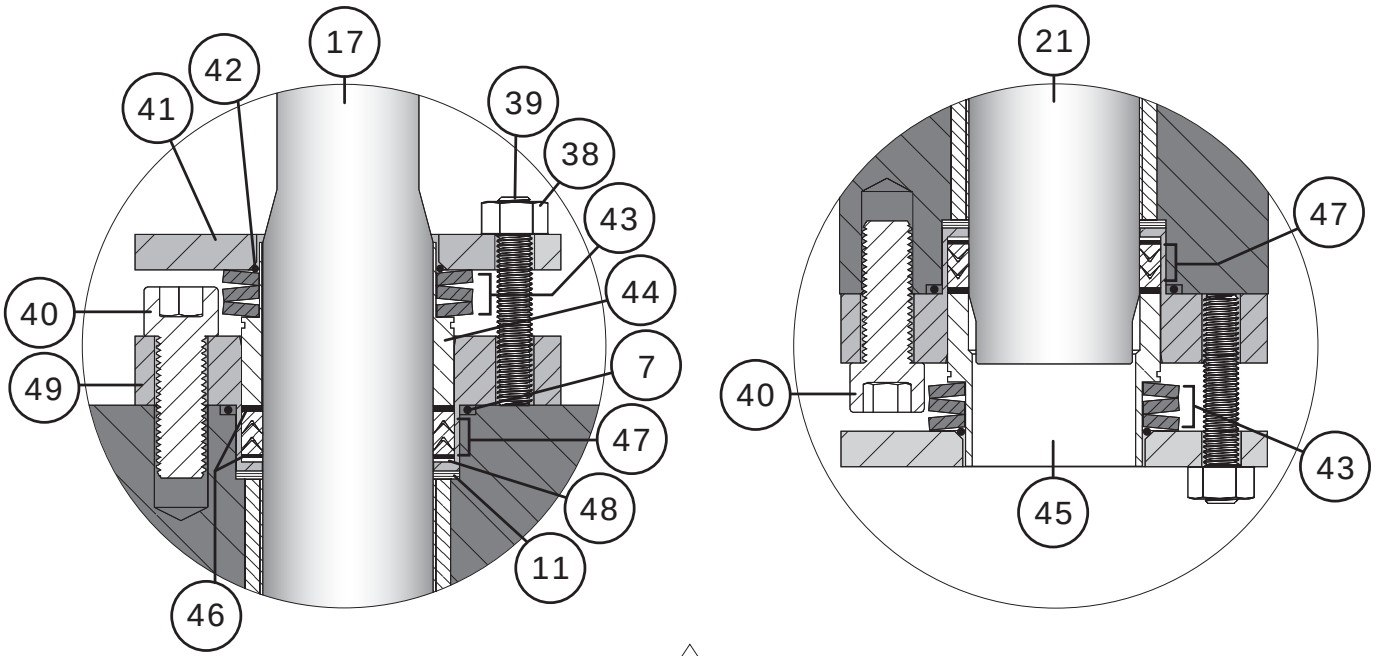



**Figure 34** *12 Inch Valve Inboard and Outboard Live Loaded Packing Arrangement*

## TRAVEL ADJUSTMENT

Adjustments can be made to actuator travel with the valve assembly either in or removed from the pipeline.

### For Assemblies In The Pipeline:

1 Power the actuator, if needed, to move the ball to the fully open position. If the ball (Key 2) inside bore is not perpendicular to the flange gasket surface of the seal protector ring (Key 26) then refer to the appropriate actuator instruction manual and adjust the actuator to achieve this.

### For Assemblies Removed From Pipeline:

1 Rotate the ball (Key 2) to the fully open position. The ball is full open when the inside surface of the ball bore is square with the line flange gasket surface of the seal protector ring (Key 26).

2 Refer to the appropriate actuator instruction manual and adjust the actuator until the inside surface of the ball bore is at a right angle to the line flange gasket surface of the seal protector ring.

3 Reposition the indicator scale (Key 24) until the open position of the indicator is aligned with the indicator arrow stamped into the visible surface of the follower shaft (Key 21).

**Table 7**

**Seal Carrier Torque Requirements**

| Valve Size | **Nut,** Seal Carrier (Key 3) | |
|---|---|---|
| | lbf-ft. | N•m |
| 4 | 95 | 129 |
| 6 | 125 | 169 |
| 8 | 275 | 373 |
| 10 | 275 | 373 |
| 12 | 275 | 373 |
| 16 | 405 | 549 |

**Table 8**

**Shaft Retainer (Key 16) and Retainer Screw (Key 20) Torque Requirements**

| Valve Size | Shaft Retainer | | Retainer Screw | |
|---|---|---|---|---|
| | lbf-ft. | N•m | lbf-ft. | N•m |
| 4 | 100 | 136 | 20 | 27 |
| 6 | 560 | 759 | 20 | 27 |
| 8 | 1,025 | 1,390 | 30 | 41 |
| 10 | 1,295 | 1,760 | 30 | 41 |
| 12 | 1,760 | 2,390 | 50 | 68 |
| 16 | 2,825 | 3,830 | 50 | 68 |

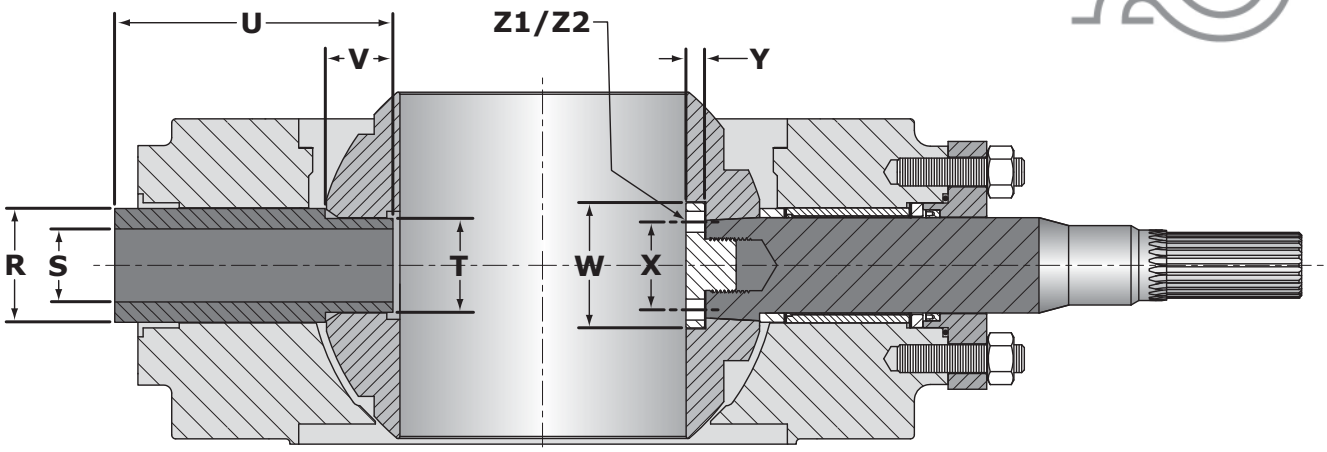



**Figure 35** *Ball Support Post and Shaft Retainer Removal Tool Construction Dimensions*

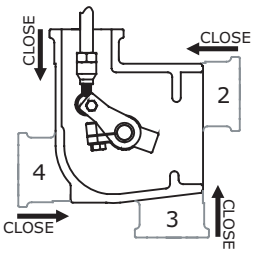
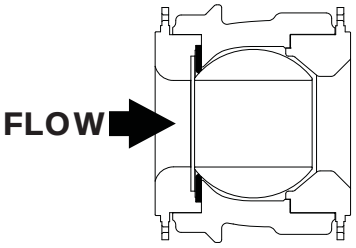
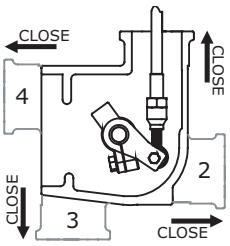
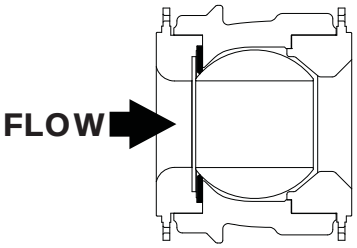
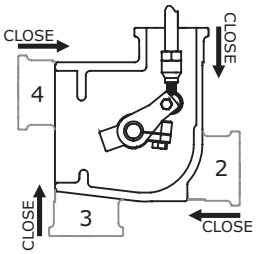
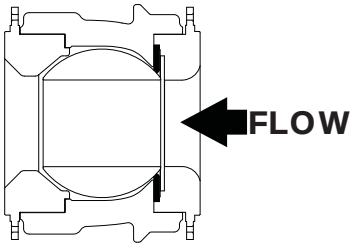
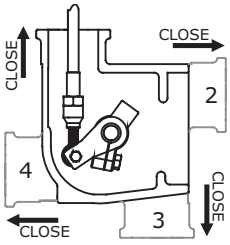
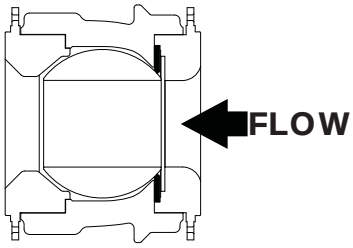
**Table 9**

**Ball Support Post and Shaft Retainer Removal Tool Dimensions Inch (mm)**

| Valve Size | R* | S | T* | U | V | W | X | Y | Z1 | Z2* |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 Inch | 1.615 (41.02) | 0.938 (23.83) | 1.245 (31.62) | 5.750 (146.1) | 0.875 (22.23) | 1.813 (46.05) | 1.188 (30.18) | 0.313 (7.95) | 4 holes | 0.342 (8.69) |
| | 1.605 (40.77) | | 1.235 (31.37) | | | | | | | 0.356 (9.04) |
| 6 Inch | 2.490 (63.25) | 1.625 (41.28) | 1.995 (50.67) | 6.500 (165.1) | 1.000 (25.40) | 2.688 (68.28) | 1.812 (46.02) | 0.438 (11.13) | 4 holes | 0.527 (13.39) |
| | 2.480 (62.99) | | 1.985 (50.42) | | | | | | | 0.547 (13.89) |
| 8 Inch | 2.990 (75.95) | 2.000 (50.80) | 2.495 (63.37) | 8.500 (215.9) | 1.375 (34.93) | 3.375 (85.73) | 2.188 (55.58) | 0.500 (12.70) | 4 holes | 0.652 (16.56) |
| | 2.980 (75.69) | | 2.485 (63.12) | | | | | | | 0.672 (17.07) |
| 10 Inch | 3.365 (85.47) | 2.125 (53.98) | 2.745 (69.72) | 8.500 (215.9) | 1.750 (44.45) | 3.438 (87.33) | 2.188 (55.58) | 0.625 (15.88) | 4 holes | 0.652 (16.56) |
| | 3.355 (85.22) | | 2.735 (69.47) | | | | | | | 0.672 (17.07) |
| 12 Inch | 3.615 (91.82) | 2.375 (60.33) | 2.995 (76.07) | 9.000 (228.6) | 2.000 (50.80) | 3.938 (100.03) | 2.562 (65.07) | 0.563 (14.30) | 4 holes | 0.777 (19.74) |
| | 3.605 (91.57) | | 2.985 (75.82) | | | | | | | 0.801 (20.35) |
| 16 Inch | 4.990 (126.7) | 3.250 (82.55) | 3.990 (101.3) | 11.500 (292.1) | 2.625 (66.68) | 5.438 (138.13) | 3.688 (93.68) | 0.750 (19.05) | 4 holes | 1.025 (26.04) |
| | 4.975 (126.4) | | 3.975 (101.0) | | | | | | | 1.051 (26.70) |

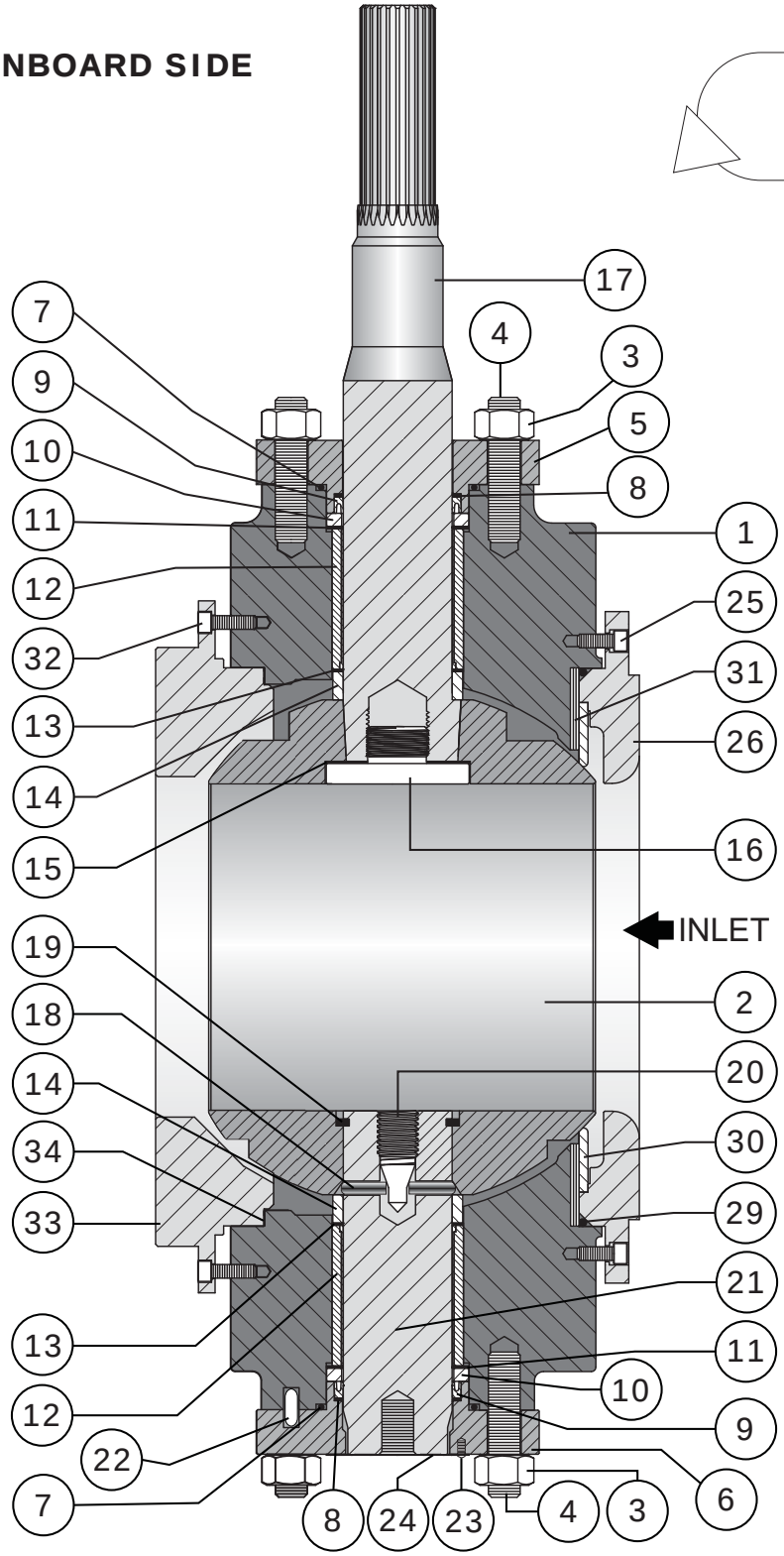
***NOTE:** Indicates the maximum and minimum dimensions to establish tolerances.

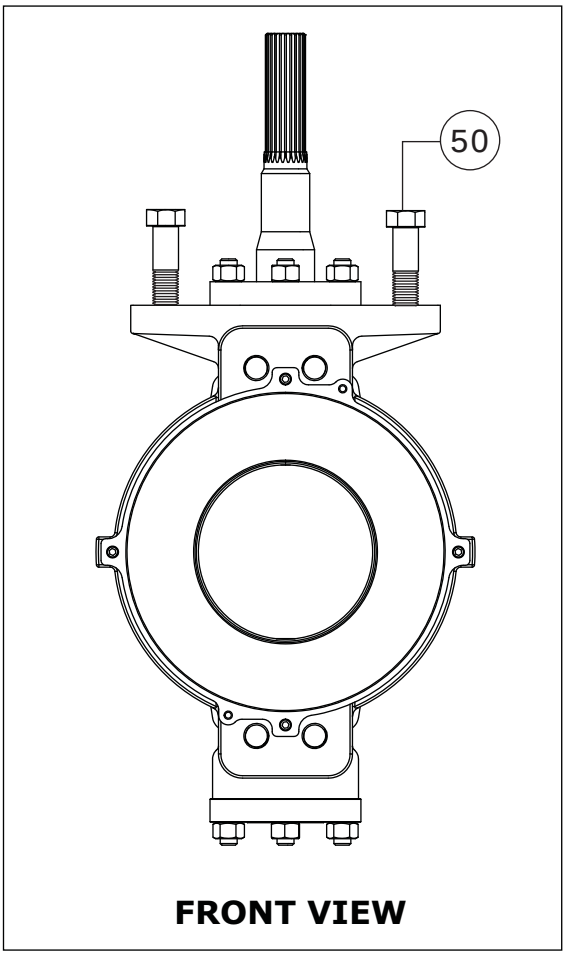
**Figure 36** *Actuator / Valve Position Chart*

| | ACTUATOR (diagrams shown using DFRP model actuators) | VALVE OPEN |
|---|---|---|
| RIGHT-HAND MOUNTED ACTUATOR | **STYLE A**<br>PUSH DOWN TO CLOSE (PDTC)<br>ACTUATOR POSITIONS |  |  |
| | **STYLE B**<br>PUSH DOWN TO OPEN (PDTO)<br>ACTUATOR POSITIONS |  |  |
| LEFT-HAND MOUNTED ACTUATOR | **STYLE C**<br>PUSH DOWN TO CLOSE (PDTC)<br>ACTUATOR POSITIONS |  |  |
| | **STYLE D**<br>PUSH DOWN TO OPEN (PDTO)<br>ACTUATOR POSITIONS |  |  |

**INBOARD SIDE**

**Figure 37**
*Typical Single Seal Valve Assembly*

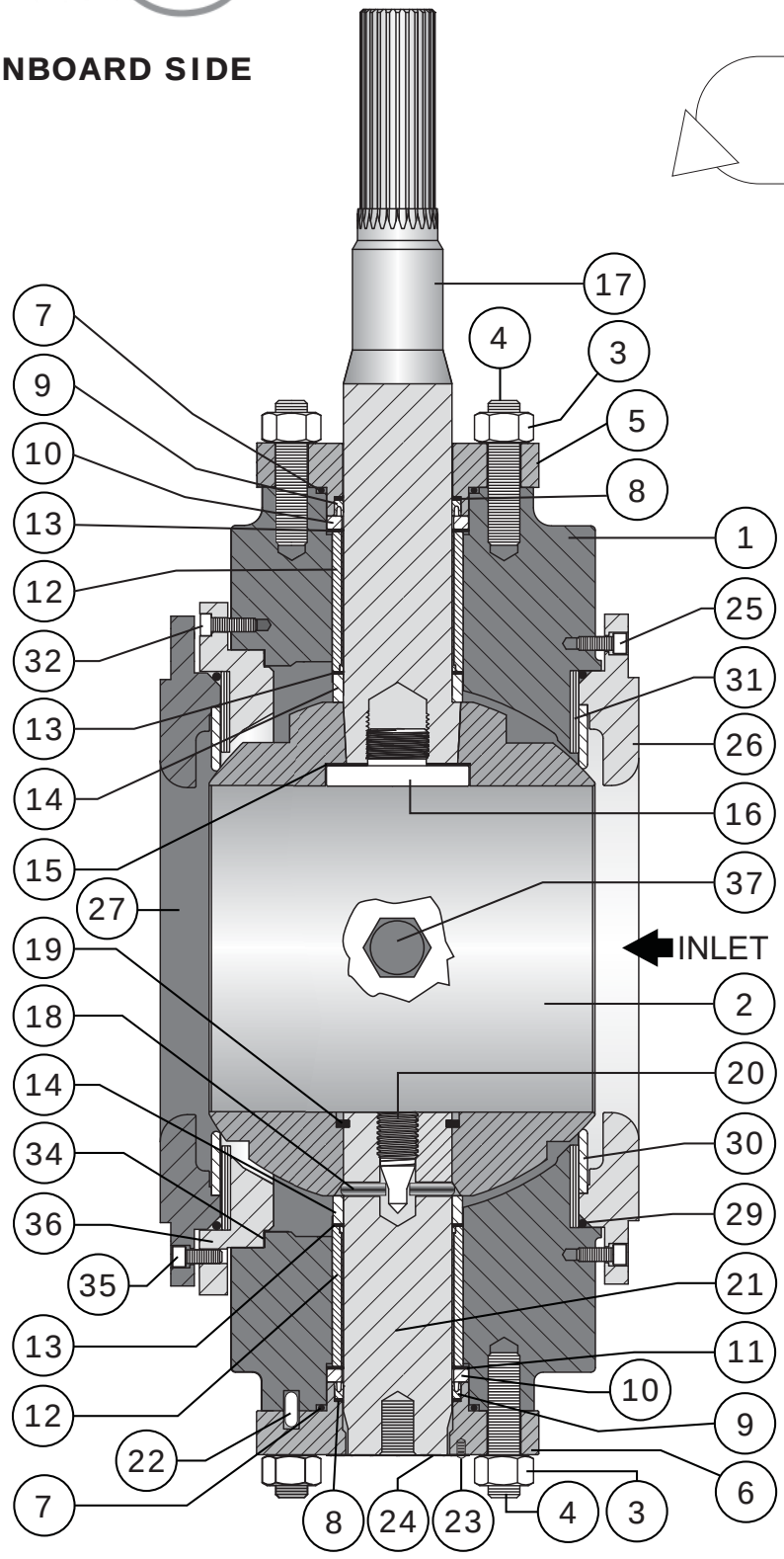


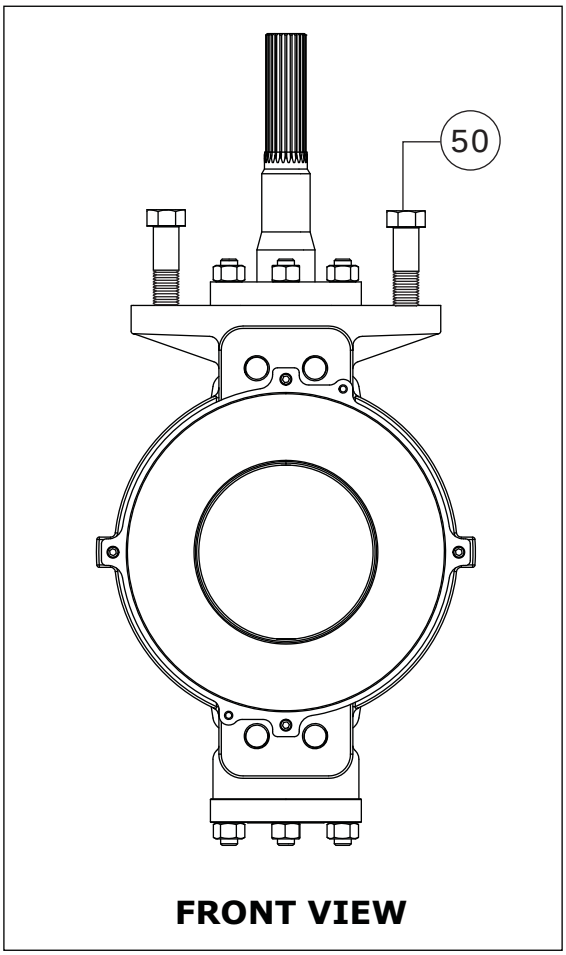




**OUTBOARD SIDE**

**INBOARD SIDE**

**Figure 38**
*Typical Dual Seal Valve Assembly*




**OUTBOARD SIDE**

## Parts

| Key | Description | Part Number |
|---|---|---|
| 1 | **Body** | |
| | if you need a body as a replacement part, order by valve size and stem diameter, serial number and desired material. | |
| 2 | **Ball** | |
| | WCC Chrome Plated (Standard) | |
| | 4 Inch | 38A2506X04D |
| | 6 Inch | 37A6669X04D |
| | 8 Inch | 38A2562X04D |
| | 10 Inch | 48A2594X04D |
| | 12 Inch | 47A6514X04D |
| | 16 Inch | 48A4554X04D |
| | S31600 Chrome Plated | |
| | 4 Inch | 38A2506X02D |
| | 6 Inch | 37A6669X02D |
| | 8 Inch | 38A2562X02D |
| | 10 Inch | 48A2594X02D |
| | 12 Inch | 47A6514X02D |
| | 16 Inch | 48A4554X02D |
| 3 | **Nut,** Seal Carrier, | |
| | 2HM, 8 Required | |
| | 4 Inch | 1C33062HMDD |
| | 6 Inch | 1A37602HMDD |
| | 8 Inch | 1C1727X004D |
| | 10 Inch | 1C1727X004D |
| | 12 Inch | 1C1727X004D |
| | 16 Inch | 1A44092HMDD |
| 4 | **Stud,** Seal Carrier, | |
| | B7M, 8 Required | |
| | 4 Inch | 1R2848B7MDD |
| | 6 Inch | 1A3653X005D |
| | 8 Inch | 1A2250X009D |
| | 10 Inch | 1A2250X009D |
| | 12 Inch | 1A2250X009D |
| | 16 Inch | 1L6223X007D |
| 5 | **Inboard Seal Carrier,** S31600 | |
| | 4 Inch | 28A2515X03D |
| | 6 Inch | 28A2540X03D |
| | 8 Inch | 28A2572X03D |
| | 10 Inch | 28A2604X03D |
| | 12 Inch | 28A2633X03D |
| | 16 Inch | 28A4564X03D |
| 6 | **Outboard Seal Carrier,** S31600 | |
| | 4 Inch | 28A2514X03D |
| | 6 Inch | 28A2539X03D |
| | 8 Inch | 28A2571X03D |
| | 10 Inch | 28A2603X03D |
| | 12 Inch | 28A2632X03D |
| | 16 Inch | 28A4563X03D |
| 7 | **O-Ring,** Seal Carrier, | |
| | Fluorocarbon, 2 Required | |
| | 4 Inch | 1K1365X005D |
| | 6 Inch | 1D4392X002D |
| | 8 Inch | 1K1810X002D |
| | 10 Inch | 1D7357X001D |
| | 12 Inch | 1P7427X002D |
| | 16 Inch | 1R3214X001D |
| 8 | **Backup Ring,** PEEK, Included with the seal ring | |
| 9 | **Seal Ring,** Seal Carrier, | |
| | R30003 Spring Loaded CPTFE, 2 Required | |
| | 4 Inch | Consult Dyna-Flo |
| | 6 Inch | Consult Dyna-Flo |
| | 8 Inch | Consult Dyna-Flo |
| | 10 Inch | Consult Dyna-Flo |
| | 12 Inch | Consult Dyna-Flo |
| | 16 Inch | Consult Dyna-Flo |
| 10 | **Spacer,** S31600/S31603 Dual Grade, | |
| | 2 Required | |
| | 4 Inch | 18A2524X02D |
| | 6 Inch | 18A2549X02D |
| | 8 Inch | 18A2580X02D |
| | 10 Inch | 18A2613X02D |
| | 12 Inch | 18A2643X01D |
| | 16 Inch | 18A4573X02D |
| 11 | **Bushing Spacer Shims,** S31600 | |
| | 4 Inch | 18A2525X01D |
| | 6 Inch | 18A2550X01D |
| | 8 Inch | 18A2581X01D |
| | 10 Inch | 18A2614X01D |
| | 12 Inch | 18A2643X01D |
| | 16 Inch | 18A4574X01D |

## Parts (Continued)

| Key | Description | Part Number |
|---|---|---|
| 12 | **Bushing,** S31600/S31603 Dual Grade / CPTFE, | |
| | 2 Required | |
| | 4 Inch | 18A2520X04D |
| | 6 Inch | 18A2545X05D |
| | 8 Inch | 28A2577X05D |
| | 10 Inch | 18A2609X05D |
| | 12 Inch | 28A2638X05D |
| | 16 Inch | 28A4569X05D |
| 13 | **Thrust Washer,** CTFE, | |
| | 2 Required | |
| | 4 Inch | 18A2522X01D |
| | 6 Inch | 18A2547X01D |
| | 8 Inch | 18A2588X01D |
| | 10 Inch | 18A2611X01D |
| | 12 Inch | 18A2640X01D |
| | 16 Inch | 18A4571X01D |
| 14 | **Thrust Spacer,** S31600/S31603 Dual Grade | |
| | 2 Required | |
| | 4 Inch | 18A2521X02D |
| | 6 Inch | 18A2547X01D |
| | 8 Inch | 18A2578X02D |
| | 10 Inch | 18A2610X02D |
| | 12 Inch | 18A2642X02D |
| | 16 Inch | 18A4570X02D |
| 15 | **Shaft Retainer Washer,** S31600 | |
| | 4 Inch | 18A2526X01D |
| | 6 Inch | 18A2551X02D |
| | 8 Inch | 18A2582X01D |
| | 10 Inch | 18A2615X01D |
| | 12 Inch | 18A2644X01D |
| | 16 Inch | 18A4575X01D |
| 16 | **Shaft Retainer,** S20910 | |
| | 4 Inch | 18A2517X02D |
| | 6 Inch | 18A2542X02D |
| | 8 Inch | 18A2574X02D |
| | 10 Inch | 18A2606X02D |
| | 12 Inch | 18A2635X02D |
| | 16 Inch | 28A4566X02D |
| 17 | **Drive Shaft,** S20910 | |
| | 4 Inch | 38A2518X02D |
| | 6 Inch | 590X622X02D |
| | 8 Inch | 38A2575X02D |
| | 10 Inch | 38A2607X02D |
| | 12 Inch | 38A2636X02D |
| | 16 Inch | 38A8604X02D |
| 18 | **Pin,** Follower Shaft, | |
| | S31600/S31603 Dual Grade, 2 Required | |
| | 4 Inch | 18A5012X01D |
| | 6 Inch | 18A5013X01D |
| | 8 Inch | 18A2587X01D |
| | 10 Inch | 18A2621X01D |
| | 12 Inch | 18A5014X01D |
| | 16 Inch | 18A4580X01D |
| 19 | **Split Ring,** S31600/S31603 Dual Grade | |
| | 4 Inch | 1P5684X012D |
| | 6 Inch | 18A5025X01D |
| | 8 Inch | 1R6690X008D |
| | 10 Inch | 18A2620X01D |
| | 12 Inch | 1R5823X005D |
| | 16 Inch | 18A4583X01D |
| 20 | **Retainer Screw,** Follower Shaft | |
| | S31600 | |
| | 4 Inch | 18A5018X01D |
| | 6 Inch | 18A5015X01D |
| | 8 Inch | 18A5020X01D |
| | 10 Inch | 18A5022X01D |
| | 12 Inch | 18A5024X01D |
| | 16 Inch | 18A4582X01D |
| 21 | **Follower Shaft,** S20910 | |
| | 4 Inch | 28A2519X02D |
| | 6 Inch | 28A2544X02D |
| | 8 Inch | 28A2576X02D |
| | 10 Inch | 28A2608X02D |
| | 12 Inch | 38A2637X02D |
| | 16 Inch | 28A4568X02D |
| | 16 Inch | 48A4556X06A |
| 22 | **Locator Pin,** Outboard Seal Carrier, | 1B5987X006D |
| | 18-8 | |
| 23 | **Screw,** Indicator Scale, Steel | 1A8664X00AD |
| | 3 Required | |
| 24 | **Indicator Scale,** S30400 | |
| | 4 Inch | 38A5028X01D |
| | 6 Inch | 38A5029X01D |
| | 8 Inch | 38A5032X01D |
| | 10 Inch | 38A5033X01D |

### Parts (Continued)

| Key | Description | Part Number |
|---|---|---|
| 24 | **Indicator Scale,** Continued | |
| | 12 Inch | 38A5034X01D |
| | 16 Inch | 38A5035X01D |
| 25 | **Cap Screws,** Seal Protector Ring, | |
| | 18-8 | |
| | 4 Inch (2 Required / Ring) | SCC18.8516.100 |
| | 6 Inch (2 Required / Ring) | SCC18.8516.100 |
| | 8 Inch (4 Required / Ring) | SCC18.8516.100 |
| | 10 Inch (4 Required / Ring) | SCC18.8516.100 |
| | 12 Inch (4 Required / Ring) | 1A5607X001D |
| | 16 Inch (- Required) | |
| 26 | **Seal Protector Ring** | |
| | -LCC | |
| | 4 Inch | 38A2508X01A |
| | 6 Inch | 38A2533X01A |
| | 8 Inch | 48A2564X01A |
| | 10 Inch | 38A2596X01A |
| | 12 Inch | 38A2625X01A |
| | 16 Inch | 18A4570X02D |
| | -WCC (Special Order) | |
| | 4 Inch | 38A2508X04A |
| | 6 Inch | 38A2533X04A |
| | 8 Inch | 41B9691X04A |
| | 10 Inch | 31B9720X04A |
| | 12 Inch | 32B0032X04A |
| | 16 Inch | 48A4556X04A |
| | -CF8M | |
| | 4 Inch | 38A2508X02A |
| | 6 Inch | 38A2533X02A |
| | 8 Inch | 41B9691X02A |
| | 10 Inch | 31B9720X02A |
| | 12 Inch | 32B0032X02A |
| | 16 Inch | 48A4556X02A |
| 27 | **Seal Protector Ring,** Dual Seal, | |
| | LCC | |
| | 4 Inch | 38A2508X01A |
| | 6 Inch | 590X611X04A |
| | 8 Inch | 48A2564X01A |
| | 10 Inch | 38A2596X01A |
| | 12 Inch | 38A2625X01A |
| | 16 Inch | 48A4556X06A |

| Key | Description | Part Number |
|---|---|---|
| 27 | **Seal Protector Ring,** Dual Seal (Continued) | |
| | -WCC (Special Order) | |
| | 4 Inch | 38A2508X04A |
| | 6 Inch | 38A2533X04A |
| | 8 Inch | 41B9691X04A |
| | 10 Inch | 31B9720X04A |
| | 12 Inch | 32B0032X04A |
| | 16 Inch | 48A4556X04A |
| | -CF8M | |
| | 4 Inch | 38A2508X02A |
| | 6 Inch | 38A2533X02A |
| | 8 Inch | 41B9691X02A |
| | 10 Inch | 31B9720X02A |
| | 12 Inch | 32B0032X02A |
| | 16 Inch | 48A4556X02A |
| 28 | **Flow Ring** | |
| | -LCC | |
| | 4 Inch | 590X402X01D |
| | 6 Inch | 590X602X01D |
| | 8 Inch | 590X802X01D |
| | 10 Inch | 590X102X01D |
| | 12 Inch | 590X122X01D |
| | 16 Inch | 590X162X01D |
| | -WCC (Special Order) | |
| | 4 Inch | 590X402X04D |
| | 6 Inch | 590X602X04D |
| | 8 Inch | 590X802X04D |
| | 10 Inch | 590X102X04D |
| | 12 Inch | 590X122X04D |
| | 16 Inch | 590X162X04D |
| | -CF8M | |
| | 4 Inch | 590X402X02D |
| | 6 Inch | 590X602X02D |
| | 8 Inch | 590X802X02D |
| | 10 Inch | 590X102X02D |
| | 12 Inch | 590X122X02D |
| | 16 Inch | 590X162X02D |
| 29 | **O-Ring,** Seal Protector Ring, Fluorocarbon | |
| | 4 Inch | 19A1334X02D |
| | 6 Inch | 18A2556X03D |
| | 8 Inch | 1P5585X003D |
| | 10 Inch | 1V28260638D |
| | 12 Inch | 18A2648X02D |
| | 16 Inch | 18A4579X02D |

## Parts (Continued)

| Key | Description | Part Number |
|---|---|---|
| 30 | **Ball Seal,** Acetal | |
| | 4 Inch | 18A2528X01D |
| | 6 Inch | 18A2553X01D |
| | 8 Inch | 18A2584X01D |
| | 10 Inch | 18A2617X01D |
| | 12 Inch | 1R83470637D |
| | 16 Inch | 18A4576X01D |
| 31 | **Shims,** S31600 | |
| | 3 Required (6 for proper install) | |
| | 4 Inch | 18A2529X01D |
| | 6 Inch | 18A2554X01D |
| | 8 Inch | 18A2585X01D |
| | 10 Inch | 18A2618X01D |
| | 12 Inch | 18A2646X01D |
| | 16 Inch | 18A4577X01D |
| 32 | **Cap Screws,** Body Outlet / Dual Seal Adapter Ring, | |
| | 18-8 | |
| | 4 Inch (2 Required) | SCC18.8516.100 |
| | 6 Inch (2 Required) | 1N40062898D |
| | 8 Inch (4 Required) | 1N40062898D |
| | 10 Inch (4 Required) | 1N40062898D |
| | 12 Inch (4 Required) | 10A1058X08D |
| | 16 Inch (4 Required) | |
| 33 | **Body Outlet** | |
| | -LCC | |
| | 4 Inch | 38A2511X01A |
| | 6 Inch | 38A2536X01D |
| | 8 Inch | 48A2567X01A |
| | 10 Inch | 38A2599X01A |
| | 12 Inch | 38A2628X01A |
| | 16 Inch | 48A4559X06A |
| | -WCC (Special Order) | |
| | 4 Inch | 38A2511X04A |
| | 6 Inch | 38A2536X04A |
| | 8 Inch | 41B9692X04A |
| | 10 Inch | 31B9719X04A |
| | 12 Inch | 32B0033X04A |
| | 16 Inch | 48A4559X04A |
| | -CF8M | |
| | 4 Inch | 38A2511X02A |
| | 6 Inch | 38A2536X04A |
| | 8 Inch | 41B9692X02A |

| Key | Description | Part Number |
|---|---|---|
| 33 | **Body Outlet** | |
| | 10 Inch | 31B9719X02A |
| | 12 Inch | 32B0033X02A |
| | 16 Inch | 48A4592X02A |
| 34 | **Gasket,** Body Outlet / Adapter Ring, | |
| | PTFE | |
| | 4 Inch | 18A2530X01D |
| | 6 Inch | 18A2555X01D |
| | 8 Inch | 18A2586X01D |
| | 10 Inch | 18A2619X01D |
| | 12 Inch | 18A2647X01D |
| | 16 Inch | 18A4578X01D |
| 35 | **Cap Screw,** Adapter Ring, | |
| | 18-8 | |
| | 4 Inch (2 Required) | SCC18.8516.100 |
| | 6 Inch (2 Required) | SCC18.8516.100 |
| | 8 Inch (4 Required) | SCC18.8516.100 |
| | 10 Inch (4 Required) | SCC18.8516.100 |
| | 12 Inch (4 Required) | 1A5607X001D |
| | 16 Inch (- Required) | |
| 36 | **Adapter Ring,** Dual Seal, | |
| | -LCC | |
| | 4 Inch | 590X410X01D |
| | 6 Inch | 590X610X01D |
| | 8 Inch | 590X810X01D |
| | 10 Inch | 590X510X01D |
| | 12 Inch | 590X120X01D |
| | 16 Inch | 590X160X01D |
| | -WCC (Special Order) | |
| | 4 Inch | 590X410X04D |
| | 6 Inch | 590X610X04D |
| | 8 Inch | 590X810X04D |
| | 10 Inch | 590X510X04D |
| | 12 Inch | 590X120X04D |
| | 16 Inch | 590X160X04D |
| | -CF8M | |
| | 4 Inch | 590X410X02D |
| | 6 Inch | 590X610X02D |
| | 8 Inch | 590X810X02D |
| | 10 Inch | 590X510X02D |
| | 12 Inch | 590X120X02D |
| | 16 Inch | 590X160X02D |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## Parts (Continued)

| Key | Description | Part Number |
|---|---|---|
| 37 | **Pipe Plug,** 2 Required | |
| | -SA351/LF2 (For LCC Valve Body) | |
| | 1/2" - For 4" Valve Body | PFP12100X01D |
| | 3/4" - All Other Valve Sizes | DFVX00006D |
| | -SA105 (For WCC Valve Body) | |
| | 1/2" - For 4" Valve Body | HPP12 |
| | 3/4" - All Other Valve Sizes | DFVX00003D |
| | -S31600 (For CF8M Valve Body) | |
| | 1/2" - For 4" Valve Body | |
| | 3/4" - All Other Valve Sizes | DFVX000004D |
| 38 | **Nut,** Live Loaded Packing Flange, | |
| | 8M, 4 Required | |
| | 4 Inch | NH316C12 |
| | 6 Inch | 1A34333525D |
| | 8 Inch | 1C17273525D |
| | 10 Inch | 1C17273525D |
| | 12 Inch | 1C17273525D |
| | 16 Inch | |
| 39 | **Stud,** Live Loaded Packing Flange, | |
| | B8M, 4 Required | |
| | 4 Inch | STB8M-012-238 |
| | 6 Inch | STB8M-058-375 |
| | 8 Inch | STB8M-078-400 |
| | 10 Inch | STB8M-078-400 |
| | 12 Inch | STB8M-078-400 |
| | 16 Inch | |
| 40 | **Cap Screw,** Live Loaded Packing, | SCC316.78.212 |
| | 12 Inch Seal Carrier, S31600, | |
| | 8 Required | |
| 41 | **Packing Flange,** Live Loaded, | |
| | S31600/S31603 Dual Grade, 2 Required | |
| | 4 Inch | LLR12590PFD |
| | 6 Inch | LLR20590PFD |
| | 8 Inch | LLR25590PFD |
| | 10 Inch | LLR25590PFD |
| | 12 Inch | LLR30590PFD |
| | 16 Inch | |
| 42-48 | See Table 10 | |

| Key | Description | Part Number |
|---|---|---|
| 49 | **Packing Box,** Live Loaded, | |
| | S31600, 2 Required | |
| | 4 Inch | 590X421X01D |
| | 6 Inch | 590X621X01D |
| | 8 Inch | 590X821X01D |
| | 10 Inch | 590X021X01D |
| | 12 Inch | 590X121X01D |
| | 16 Inch | |
| 50 | **Actuator Mounting Bolts,** | |
| | Grade 5 Steel | |
| | 4 Inch | NH316C12 |
| | 6 Inch | H5CZ34.134 |
| | 8 Inch | H5CZ78.212 |
| | 10 Inch | H5CZ78.212 |
| | 12 Inch | H5CZ78.212 |
| | 16 Inch | H5CZ78.212 |
| 51 | **Flange Stud** | |
| 52 | **Short Cap Screw** | |
| 53 | **Long Cap Screw** | |

### Parts Ordering

Whenever corresponding with Dyna-Flo about a 590 Control Valve, refer to the nameplate for the serial number of the unit. Please order by the complete part number (as given in the following parts list) of each part required.

Table 10

**Live Loaded Packing Retro-Fit Kit**

| Valve Size | Part Number |
|---|---|
| 4 Inch | R590XLR040D |
| 6 Inch | R590XLR060D |
| 8 Inch | R590XLR080D |
| 10 Inch | R590XLR100D |
| 12 Inch | R590XLR120D |
| 16 Inch | R590XLR160D |
| **Kit Includes** | |
| **Key** | **Description** |
| 7 (Quantity 2) | Seal Carrier O-ring |
| 39 (Quantity 4) | Live Loaded Packing Flange Stud |
| 38 (Quantity 4) | Live Loaded Packing Flange Nut |
| 41 (Quantity 2) | Packing Flange |
| 42 (Quantity 2) | Packing Flange O-Ring |
| 43 (Refer to Figures 31 to 34 for Quantity) (2 Sets) | Spring Washers |
| 44 | Live Loaded Packing Follower (Drive Shaft) |
| 45 | Live Loaded Packing Follower (Follower Shaft) |
| 49 (Quantity 2) | Packing Box |
| 46 (Quantity 2) | Anti-extrusion Ring |
| 47 (Refer to Figures 31 to 34 for Quantity) (2 Sets) | PTFE Packing Set |
| 48 (Quantity 2) | Packing Box Ring |
| 40 (Quantity 8) | Live Loaded Packing Cap Screw (12” Valve) |

Table 11

**Live Loaded Repair Kit**

| Size | Part Number |
|---|---|
| 4 Inch | R590XL0040D |
| 6 Inch | R590XL0060D |
| 8 Inch | R590XL0080D |
| 10 Inch | R590XL0100D |
| 12 Inch | R590XL0120D |
| 16 Inch | R590XL0160D |
| **Kit Includes** | |
| **Key** | **Description** |
| 7 (Quantity 2) | Seal Carrier O-ring |
| 46 (Quantity 2) | Anti-extrusion Ring |
| 47 (Refer to Figures 31 to 34 for Quantity) (2 Sets) | PTFE Packing Set |
| 48 (Quantity 2) | Packing Box Ring |

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# Model 590 Control Valve

## MODEL NUMBERING SYSTEM

**SAMPLE PART NUMBER: 590-8-CLS-PN**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **VALVE SIZE** | | | | | | | | **8** |
| **4** | 4 INCH | **6** | 6 INCH | **8** | 8 INCH | **10** | 10 INCH | |
| **12** | 12 INCH | **16** | 16 INCH | | | | | |
| **BALL MATERIAL** | | | | | | | | **-** |
| **-** | WCC / CRPL | **S** | CF8M / CRPL | | | | | |
| **ASME RATING / END CONNECTION** | | | | | | | | **C** |
| **C** | 600 RF | **D** | 900 RF | **E** | 600 RTJ | **F** | 900 RTJ | |
| **BODY MATERIAL** | | | | | | | | **L** |
| **L** | LCC | **W** | WCC* | **M** | CF8M | | | |
| **BALL SEAL CONFIGURATION** | | | | | | | | **S** |
| **S** | SINGLE SEAL | **D** | DUAL SEAL | **F** | FLOW RING | | | |
| **PAINT** | | | | | | | | **-** |
| **-** | DFPS-01 (STANDARD) | | | **2** | DFPS-02 (SEVERE SERVICE) | | | |
| **3** | DFPS-03 (HIGH TEMPERATURE) | | | | | | | |
| **SHAFT SEALS** | | | | | | | | **P** |
| **P** | R30003 / CPTFE SHAFT SEALS (STANDARD) | | | **L** | LIVE LOADED PTFE PACKING | | | |
| **SHAFT MATERIAL / STYLE** | | | | | | | | **N** |
| **N** | S20910 SPLINED | **K** | S20910 KEYED | | | | | |

***NOTE:** WCC material is special order for all parts except valve ball (Key 2).

**590** ___ ___ ___ ___ ___ ___ ___ ___ ___

### *Our Commitment to Quality*

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